A STUDY OF AN INTEGRATED APPROACH FOR STRATEGY FORMULATION AND PERFORMANCE MEASUREMENT IN MANUFACTURING ENTERPRISES

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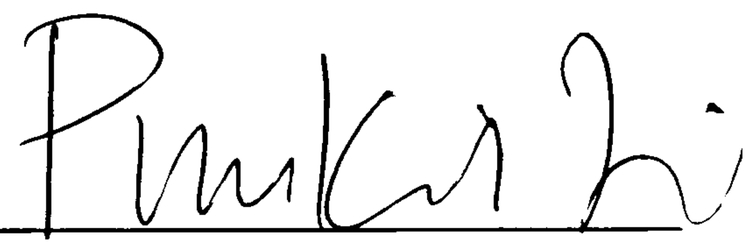
I hereby declare that this thesis embodies the result of the course of my study and research. It has been composed by myself and has not been presented for a higher degree or any other award to any other institution.

Student's Signature: 

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Abstract

Performance measurement quantifies the efficiency and effectiveness of action that helps organisations translate their strategies into results and fixes accountability to improve performance. This research identifies two problem statements: First, can integrating strategy formulation with measurement initiatives safeguard the performance goals in manufacturing enterprises? And second, how can manufacturing enterprises derive an integrated approach that meet their requirements and needs for strategy formulation (SF) and performance measurement (PM) system implementation?

This work proposes an integrated paradigm that aligns the strategy-related performance measures to attain performance improvement in manufacturing enterprises. A two-stage empirical study was conducted, with 232 Hong Kong firms and 85 Shanghai firms participating in the study. The first stage surveys identified the common success factors, problem areas and strategy choices, and examined the relationship amongst corporate, marketing, technology and operational strengths and the 'reactive/proactive' strategy choices. The subsequent personal interviews in Hong Kong complemented the survey findings by examining the impact of SF/PM efforts in manufacturing enterprises. There were two series of interviews. The first series acquired the managerial views on the decision criteria on the integration of strategy formulation and performance measures, with the aid of Analytical Hierarchy Process (AHP) methodology. The second interview series derived several design elements and process considerations for aligning strategy formulation with performance measures. The empirical study used in this research provided important inputs and served as a foundation for development of a SF/PM Integration (SPI) model.

In an attempt to integrate strategy formulation and performance measurement, the SPI model adopts the guiding principles embodied with the Business Excellence Models and stresses the results-oriented assessments on five categories of SF/PM criteria, namely *leadership and constancy of purpose*, *management by process*, *people development*, *continuous improvement*, and *results orientation*. Unlike that of the MBNQA and EQA, the point values for criteria and sub-elements of SPI model were generated collectively

from the perspectives of industry practitioners in the manufacturing sectors. These were determined using the normalised weights obtained from the AHP analysis of empirical interview findings. They are taken together to calculate the overall performance index for an organisation. The process framework comprises five stages starting from strategy formulation to implementation and evaluation of an integrated performance measurement system. It encapsulates the requirements, critical processes and activities of strategy formulation and performance measures into the way they are being managed in organisations.

The SPI model helps manufacturing enterprises to build a self-assessment platform for amalgamating strategies, plans and actions which can enable performance improvement. It can supplement any Business Excellence Models, and serves three important purposes. Firstly, it is a working tool for integrating SF and PM initiatives and guiding the implementation of performance measurement system in manufacturing enterprises. Secondly, using the model can help improve the effectiveness of management practices in relation to performance measures and self-assessment; and thirdly, using the model can facilitate information sharing of best practices within an organisation and benchmark performance against competitors and other organisations. Results of a post-evaluation survey affirmed that the model and processes could encourage organisational learning and provide a practical means for manufacturing enterprises to devise effective self-assessment and performance improvement.

The novel contributions of the research are to identify the key SF/PM attributes, develop the self-assessment scoring method and the process framework accompanying the SPI model. Manufacturing enterprises must evolve a holistic performance measurement system matching their corporate mission, objectives and strategies. The SPI model provides them with a systems approach for building and integrating the capabilities of SF and PM to attain performance improvement goals, irrespective of their business nature and sizes.

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Lastly, but in no way the least, I need to sincerely thank to my family members for their love, tolerance, encouragement and continued support. Without which, I should never complete this thesis.

Kit Fai PUN

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Table of Contents

List of Figures

List of Tables

List of Tables *(continued)*

List of Abbreviations

AB	Anticipated Benefits
AHP	Analytic Hierarchy Process
ATC	Agreement on Textile and Clothing
BE	Business Excellence
BEM	Business Excellence Model
BSC	The Balanced Scorecard
BSN	Balancing and Satisfying Stakeholders' Needs
CBS	Comparative Business Scorecard
CEO	Chief Executive Officer
CI	Consistency Index
CM	Continuous Improvement
COI	Continuous Innovation
COM	Corporate Mission, Vision and Values
CPMP	Cambridge Performance Measurement Process
CPMS	Consistent Performance Measurement Systems
CR	Consistency Ratio
CSF	Critical Success Factor
CUR	Customer Focus
DHKI	The Directory of Hong Kong Industries
DPMS	Dynamic Performance Measurement Systems
ECI	Enhancement of Corporate Image and Reputation
EFQM	European Foundation for Quality Management
EQA	European Quality Award
ETD	People Education, Training and Development
FIR	Financial Results
HK	Hong Kong
HoQ	House of Quality
IEE	Improvement of Efficiency and Effectiveness
IPMF	Integrated Performance Measurement Framework
IPMS	Integrated Performance Measurement Systems
ISP	Implementation of Strategy and Policy
IT	Information Technology
LC	Leadership and Constancy of Purposes
LE	Large Enterprises
LEC	Learning Culture
MBNQA	Malcolm Baldrige National Quality Award
MAC	Management Commitment
MIN	Management Involvement
MP	Management by Processes
NFR	Non-Financial Results
OEF	Organisational Effectiveness
OEM	Original Equipment Manufacturing
OVO	Optimisation of Value-added Operations
PD	People Development

List of Abbreviations *(Continued)*

PDCA	Plan, Do, Check and Act
PEM	People Empowerment
PI	Performance Indicator
PIN	People Involvement
PM	Performance Measurement
PMG	Performance Measurement Grid
PMQ	Performance Measurement Questionnaire
PRC	The People's Republic of China
PSP	Product and Service Processes
PWS	People Well-being and Satisfaction
QFD	Quality Function Deployment
R&D	Research and Development
R&DM	Results and Determinants Matrix
RADAR	Results, Approach, Deployment, and Assessment and Review
RI	Random Index
RO	Results Orientation
RUS	Review and Update of Strategy/Policy
SAR	Special Administrative Region
SF	Strategy Formulation
SH	Shanghai
SIN	Sharing of Information
SKN	Sharing of Knowledge
SLM	Strengthening of Loyalty and Morale
SMART	Strategic Measurement Analysis and Reporting Technique
SME	Small and Medium-sized Enterprises
SOR	Social Responsibilities
SPD	Strategy and Policy Development
SPI	SF/PM Integration
SPSS	Statistical Package for Social Sciences
TQM	Total Quality Management
WTO	The World Trade Organisation

Chapter 1
Introduction

1.1 Background to the Research

Recent developments of the World Trade Organisation and other international trade agreements have forced industries worldwide to face a new era of intense global competition (Dangayach and Deshmukh, 2001). Associated with rapid technological changes and product variety proliferation, this has led to an emerging scenario in which industries must continuously implement best practice management principles, strategies and technologies (Carpinetti *et al.*, 2000). Competition in industry has become more difficult with a greater number of buyers and sellers, increased product differentiation, entry barriers, vertical integration, diversification and cost structures (Porter, 1998). Manufacturing enterprises have to compete effectively not only in the local context, but in a wider regional and global marketplace. Platts and Gregory (1991) argue that the achievement of organisational objectives is realised through 1) the deployment of strategic decisions, 2) alignment of resources with strategy, and 3) enhancement of the ability to compete on competitive criteria (e.g. quality, cost, delivery, and flexibility). Many recent studies found that the formulation and execution of viable organisational strategies (Barnes, 2002; Porter, 1998; Segal-Horn, 1998) and the performance measurement initiatives in organisations (Bourne *et al.*, 2002; Kennerley and Neely, 2002, 2003) would determine how a company competes in the marketplace.

Many people use the words 'strategies', 'plans', 'policies' and 'objectives' interchangeably (Bennett, 1996, p.4). The term *strategy* seems to have a multitude of meanings. This is not surprising, as there is no commonly accepted and universal definition of strategy (O'Regan and Ghobadian, 2002a, b). The strategy literature reflects the complexity and diversity of strategic thought (Hutchinson, 2001). For instance, according to early scholars such as Chandler (1962), strategy is the determination of the basic goals and the objectives of an enterprise and the adoption of courses of action including the allocation of resources necessary for carrying out these goals. Andrews (1971) argues that strategy is a rational decision-making process by which the organisation's resources are matched with opportunities arising from the competitive environment. Others, such as Aldrich (1979), state that the environment has a strong deterministic influence on the strategy-making processes in organisations. On the other hand, proponents of the resource-based view also argue that it is not the environment but the resources of the organisation that form the foundation of a firm's strategy (Grant, 1991).

An examination of the definitions to-date suggests that strategy encompasses the following elements: 1) a focus on long-term direction of the organisation, 2) defining what business the organization should engage in, 3) matching the activities of the business to the environment in order to minimise the threats and maximise opportunities, and 4) matching the organisation's activities to the resources available (McDonald, 1996). Many scholars (e.g. Hill, 1997; Johnson and Scholes, 1997) classified organisational strategy into three levels, namely corporate, business, and functional strategies. For instance, according to Miller and Hayslip (1989), manufacturing is a core function of an organisation and a manufacturing strategy is a projected pattern of manufacturing capabilities, and to support

business and corporate strategy. For the purpose of this research, 'strategy' refers primarily to 'organisational strategy' in manufacturing enterprises that specifies how an entire organisation or its business units achieve and maintain competitive advantage within its industry.

Recent literature (e.g. Barnes, 2002; Hayes and Upton, 1998; Pearce and Robinson, 1998; Pilkington, 1998) indicates that *strategy formulation* (SF) helps organisations assert their vital continuity and facilitates their adaptation to changing environments. There are many different perspectives on strategy in the literature. Scholars (e.g. McNamee, 1990; Mintzberg, 1994a, b) wrote about the influence of structure on strategy, others have focused on leadership (Leavy and Wilson, 1994), culture (Stacey, 1993), or industrial analysis (Porter, 1980, 1985). Mintzberg (1994a) has argued that there is no predetermined strategy but strategy has to emerge, not necessarily in an incremental way, rather that it should be left to those that do to be crafted, and only when it has emerged will it actually be recognised. There is a growing cognizance that traditional approaches to strategy development often do not lead to the intended results in highly dynamic environments (Feurer and Chaharbaghi, 1995a). Organisations have to move towards a more dynamic concept as the underlying conditions change before formulated strategies can be fully implemented (e.g. Feurer and Chaharbaghi, 1995a; Porter, 1998). They must determine what makes the most sense in light of their positions in the industry and perform an integrated analysis of external environment and assessment of internal competencies. However, the *way* in which an integrated approach to strategy formulation can be achieved is worthy of investigating.

Mintzberg (1994a, b) argues that strategies are realised through consistency of decision-making and action. *Performance measurement* (PM) provides a means of inducing this (Kaplan, 1990; Hall *et al.,* 1991). PM is the process of quantifying the efficiency and effectiveness of action (Neely *et al.*, 1995) that helps organisations translate their strategies into results (Kermally, 1997; Parker, 2000), and fixes accountability for behaviour and results to improve performance (Schneier *et al.*, 1995). Buxton and Ward (1998) argue that PM links to performance management though the setting of goals, standards and targets for improving an enterprise's performance. It also serves a wide range of purposes including monitoring internal systems, monitoring external performance, tracking the implementation of change, stimulating continuous improvement at system and personnel levels, and tracking the overall financial performance of an organisation (e.g. see Austin, 1996; Feurer and Chaharbaghi, 1995b; Neely *et al.*, 1995).

Performance measurement is currently attracting a great deal of interest among both industrialists and academics alike (Bourne *et al.*, 2002). The Foundation of Manufacturing Committee of the National Academy of Engineering has advocated that PM is one of the ten foundations of world-class practice (Heim and Compton, 1992). However, although there are numerous performance measurement frameworks (Keegan *et al,* 1989; Lynch and Cross, 1991; Fitzgerald *et al.*, 1991; Kaplan and Norton, 1992; Neely *et al,* 2002) and management processes for the design of performance measurement systems (Dixon *et al.*, 1991; Kaplan and Norton, 1993, 1996; Neely *et al.*, 1996; Bititci *et al.*, 1998b), there has been less research into the success and failure of performance measurement initiatives. Like other business and public sector organisations, the success of manufacturing enterprises would rely significantly on the formulation and execution of viable strategies (Barnes,

2002; Porter, 1998) and the performance measurement initiatives in organisations (Bourne *et al.*, 2002; Kennerley and Neely, 2002). Integrating SF and PM to attain sustainable competitive performance is a challenge that manufacturing enterprises face today, irrespective of business nature, sizes and locations.

1.2 Problem Statements

This research identifies two problem statements:

1) Can integrating strategy formulation with measurement initiatives safeguard the performance goals in manufacturing enterprises?
2) How can manufacturing enterprises derive an integrated approach that meet their requirements and needs for SF and PM system implementation?

In an increasingly dynamic competitive environment, an organisation's success cannot be easily explained through the formulation of any intended strategies and application of specific strategic processes or techniques (Feurer and Chaharbaghi, 1995a; Pun *et al.*, 2001a). Although it has long been recognised that PM has an important role to play in the efficient and effective management of organisations, it still remains a critical and much debated issue (Kennerley and Neely, 2002). DeFeo and Janssen (2001a) argue that both SF and PM should link every element in an organisation with a common performance goal. Therefore, the first problem statement identified for this research is to determine *whether integrating strategy formulation with measurement initiatives can safeguard the performance goals in manufacturing enterprises*. There are certainly many success stories

(e.g. Bourne and Wilcox, 1998; Kaplan and Norton, 2000), but there is also a growing literature addressing the difficulties of implementing SF and PM initiatives (e.g. McCunn, 1998; Schneiderman 1999; Neely and Bourne, 2000). According to a recent study conducted by Bourne *et al.* (2002), the common practitioners' reflections and reasons for success and failure of the initiatives can be categorised using Pettigrew and Whipp's (1993) organisational context, development process and measurement content. These are:

1) Contextual issues:

- The need for a highly developed information system (Bierbusse and Siesfeld, 1997).
- Time and expense required (Bierbusse and Siesfeld 1997; McCunn, 1998).
- Lack of leadership and resistance to change (Hacker and Brotherton, 1998; Meekings, 1995).

2) Process issues:

- Vision and strategy are not actionable (Kaplan and Norton, 1996) as there are difficulties in evaluating the relative importance of measures and the problems of identifying true 'drivers' (Bierbusse and Siesfeld, 1997; Schneiderman, 1999).
- Strategy is not linked to resource allocation (Kaplan and Norton, 1996; Meekings, 1995).
- Goals are negotiated rather than based on stakeholder requirements (Schneiderman, 1999).
- State of the art improvement methods are not used (Schneiderman, 1999).
- Striving for perfection undermined success (McCunn, 1998; Schneiderman, 1999).

3) Content issues:

- Strategy is not linked to department, team and individual goals (Kaplan and Norton 1996; Bierbusse and Siesfeld, 1997; Schneiderman, 1999).
- Large number of measures dilutes the overall impact (Bierbusse and Siesfeld, 1997).
- Metrics are too poorly defined (Schneiderman, 1999).
- The need to quantify results in areas that are more qualitative in nature (Bierbusse and Siesfeld, 1997).

The majority of these items are process and measurement content issues. This leaves the classic change management issues of leadership and resistance to change with the other contextual factors of time, expense and information systems (Bourne *et al.*, 2002). Given that much of literature is based on practitioners' reflections, further research is required.

The second problem statement then addresses *how manufacturing enterprises to derive an integrated approach for SF and PM system implementation.* Research into strategy development has come a long way since the early work in the 1960s (Bean, 1993; Feurer and Chaharbaghi, 1995a; Mintzberg, 1994). The focus of research work has shifted from identifying reasons for superior performance towards the study of strategic processes and the search for sources of competitive advantage (e.g. operational flexibility, price/cost leadership, customer services, and market penetration). There are a variety of many conceptual frameworks and tools advocated for the formulation and implementation of strategies (Feurer and Chaharbaghi, 1995a; Mintzberg, 1994; Mintzberg *et al.*, 1998). Feurer and Chaharbaghi (1995a) argue that these frameworks and tools cannot be regarded as mutually exclusive but must be seen as mutually supportive. On the other hand, organisations employ a wide range of qualitative and

quantitative measures that have accumulated over time to meet particular operational requirements (Heim and Compton, 1992). Many PM systems and tools have been developed to provide ways for organisations to measure and improve performance (e.g. Bititci *et al.*, 1998a; EFQM, 2002; Kanji, 1998; Kaplan and Norton, 1996; Neely *et al.*, 1996; NIST, 2002). However, it has still not been unusual to find many PM systems that would send confusing and occasionally contradictory signals to the organisation (Zairi, 1994; Kasul and Motwani, 1995; Richard *et al.*, 1996). This leads to a research agenda for investigating the development of an integrated approach for SF and PM system implementation.

1.3 Aim and Objectives of the Research

As the level of uncertainty in business environments increases, the strategy formulation and implementation of PM initiatives will differentiate the organisation from its competitors (Feurer and Chabharbaghi, 1996; Porter, 1998). This research aims at investigating the attributes of strategy formulation and performance measurement, and proposing an integrated paradigm that aligns the strategy-related measures to attain performance goals in manufacturing enterprises. To accomplish the aim, the research has five objectives, including:

1) To investigate the conceptual foundation and links between strategy formulation and performance measurement in the manufacturing context;
2) To identify the key attributes of SF and PM by complementing the literature base with empirical evidence;
3) To devise an approach to integrate SF and PM with a self-assessment orientation paradigm;

4) To evaluate the potential applicability of the approach and validate it with empirical evidence from industry; and
5) To provide a basis for future work in developing strategy-related performance measures for manufacturing enterprises.

The integration issue and the development of its accompanying self-assessment criteria have been a relatively under-researched area. The novel contributions of the research are to identify the list of SF/PM attributes, design the self-assessment scoring method, and develop the process framework accompanying an integrated SF/PM model for manufacturing enterprises. Drawing upon the empirical base and evidence acquired in Hong Kong and Shanghai, it is anticipated that the findings can provide insight for future research on performance improvement in manufacturing enterprises in such context. Besides, more information regarding the integration of manufacturing strategy formulation and the measurement initiatives on organisational performance is of substantial value to practitioners, researchers and scholars in the areas.

1.4 Scope and Limitations of the Research

A prime concern of the research is the type of industry and the place or region under investigation. With reference to Chinese organisations, the scope of research focuses on identifying key attributes (including strategy determinants and performance criteria), and exploring the impacts of integrating strategy formulation and PM on performance improvement. Chinese organisations widely spread over in every corner of the globe,

particularly in Mainland China, Hong Kong, Taiwan, and other Asia Pacific countries and regions (e.g. Singapore, Malaysia and Korea).

For the purposes of the research, empirical data was collected based in two Chinese cities – Hong Kong and Shanghai. These two cities were selected because of the multifaceted nature of their industrialisation and modernisation. Hong Kong has had a long-standing British colonial heritage, and became a Special Administrative Region of the People's Republic of China (PRC) under the principle of 'one country, two systems' in 1997. Over the past four decades, Hong Kong had transformed its industry from labour-intensive practices to capital- and technology-based developments, and moved from a low-cost manufacturing base to a high value-added, design- and service-oriented manufacturing centre (HKID, 1996a; Berger and Lester, 1997; Enright *et al.*, 1997; Martinsons, 1998). Hong Kong has been renowned as one of the 'Four Little Asian Dragons' and remained the capitalist and part of the free trade system after the return of its sovereignty to China (Daniel, 2001). On the other hand, Shanghai is one of China's main ports and trade has been a vital component of its economy. The interactions between Shanghai and its hinterland, the production linkages and trading ties have been numerous and strong (Yeung and Sung, 1996). Shanghai has been the crucible in which the cultural activities associated with a modern industrial society made their appearance in China (Yusuf and Wu, 1997). Since the late 1980s, Shanghai has regained its fame as an important international centre of economy, finance and trade as a result of the priority development strategy of the Chinese Government. To a considerable extent, Shanghai has also been a representative of other large industrial cities of China such as Guangzhou, Tianjin, Chongqing, Fuzhou, Hangzhou, Qingdao and Wuhan (Yeung and Sung, 1996; Yusuf and Wu, 1997).

As far as this research is concerned, a wider definition of the Hong Kong economy is chosen. The definition incorporates the economic activities of Hong Kong's business community beyond the border, including the extensive network of overseas manufacturing facilities and business operations owned, managed or directed by offices located within Hong Kong. Empirical data was acquired and analysed through the conduct of surveys and interviews of Chinese organisations operating in Hong Kong and its hinterland of Mainland China. The study focused primarily on two largest manufacturing industry sectors, in terms of their gross domestic products including the electronics industry and the textile and clothing industries in Hong Kong. However, other manufacturing sectors (e.g. plastic, toy, clock and watches, etc) and some companies from engineering services (e.g. engineering support, product design, logistics, trading, and consulting) were also included to broaden the empirical base of the study. Furthermore, with the collaboration of the Shanghai University, a group of Chinese firms was invited to participate in the study. These firms were registered members of a university-industry collaboration network based in the university. The sample of China firms served as a comparison with the surveyed companies in Hong Kong. Taken together, the empirical findings provided generalisations of critical elements and processes that influenced strategy formulation and measurement initiatives in manufacturing enterprises in both cities.

Regarding the limitations of the research, most organisations used to treat the formulation process of their strategies as highly confidential and sensitive activity. According to Nemetz's (1990) study, objective measures of performance are often difficult for academic researchers to obtain, hence causing severe difficulties in acquiring performance data and information. Moreover, another inherent limitation is the determination of the research

population and sample while addressing the strategy formulation and measurement initiatives in manufacturing enterprises of the Chinese management context. Based on the analysis of empirical findings from industries of two selected Chinese cities, this research attempts to identify the conceptual dimensions and the constructive variables for the development of an integrated approach for manufacturing strategy formulation and performance measurement, in an attempt to take part in the lively theoretical and managerial debate on the theme. It is beyond the scope of the study to suggest any tailored solutions for tackling problems in individual enterprises.

1.5 Methodologies Used in the Research

The conduct of this research combined the results of an extensive literature review, survey and interviews in the development and evaluation of a proposed integration approach for strategy formulation and performance measurement. Reviews of recent literature help gather insights on the concepts and practices associated with manufacturing strategy formulation and performance measurement. Collection of empirical data is needed. Survey and interview-type of studies are conventional means used to collect empirical data and consolidate practitioners' opinions on numerous studies in manufacturing sectors and other businesses elsewhere. For instance, Platts and Gregory (1990) use interviews with managers to extract firm's existing manufacturing strategies. Meanwhile, the Chartered Institute of Management Accountants has conducted two surveys into performance measurement in the UK, one in the service sector (Fitzgerald *et al.*, 1991) and the other in manufacturing (CIMA, 1993). Sinclair and Zairi (1995) also used a postal survey to study determine the

performance measures and benchmark best-practice performance measurement within companies. According to Scudder and Hill (1998), survey research remains popular with operations management researchers. It seems best suited to large-scale data gathering, especially where factually based data is required, as would be the case when investigating the content of manufacturing strategy and performance measurement (e.g. Barnes, 2001; Flynn *et al.*, 1997). This research employed surveys and interviews as a means to collect empirical data and consolidate practitioners' opinions on strategy formulation and performance measurement efforts in manufacturing enterprises. A diagrammatic representation of the research framework and methodologies is given in figure 1.

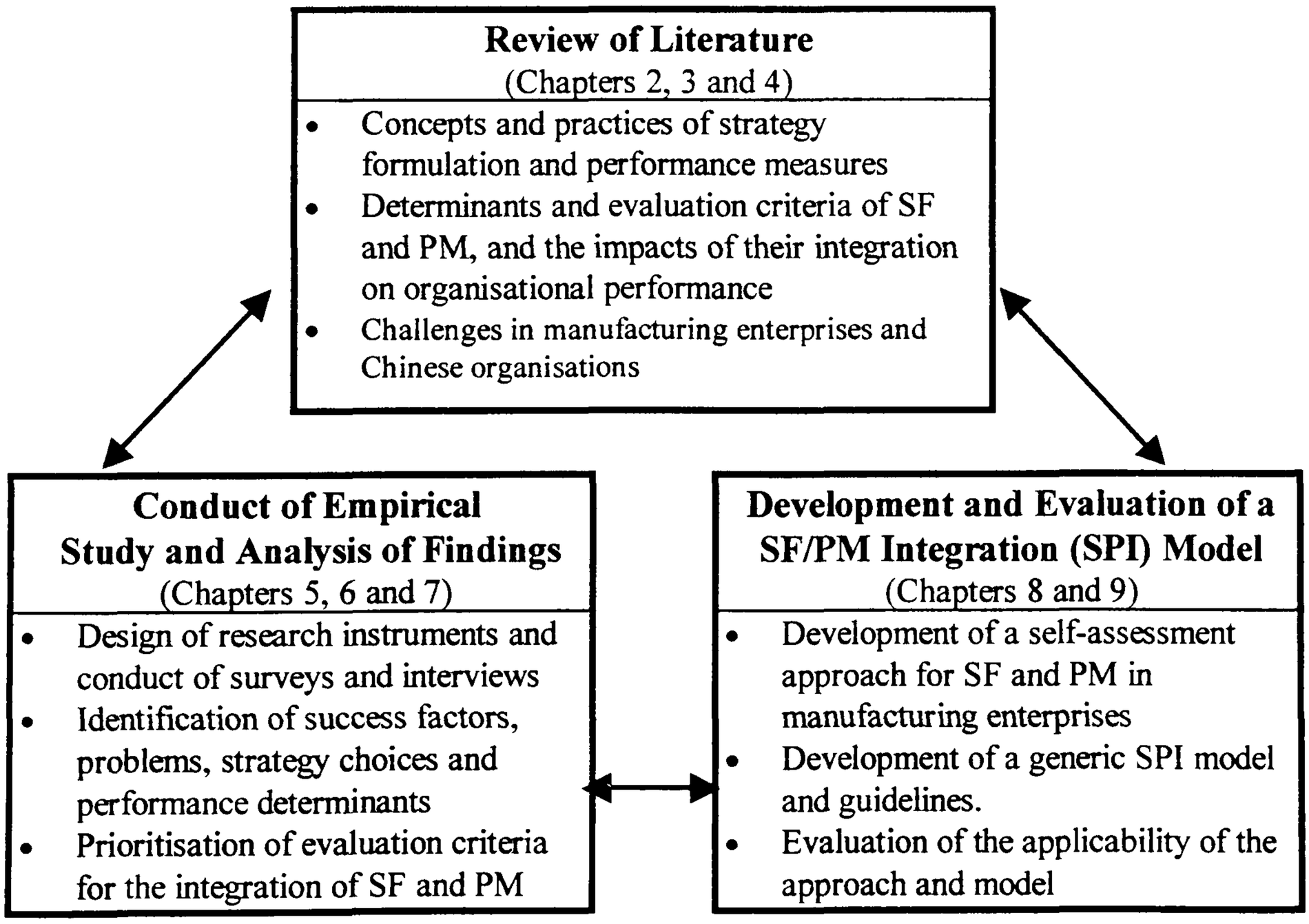

Figure 1. The research framework and methodologies

The three components of the framework are literature review, conduct of an empirical study and development of an integration model. These are elaborated separately below:

1.5.1 Literature review

An extensive review of relevant literature constituted the integral part of the research. This contributed to the identification of key parameters and variables that were used for 1) the design and conduct of the subsequent empirical survey and personal interviews; and 2) the development of the proposed integration approach for strategy formulation and performance measurement implementation in manufacturing enterprises. The review of literature addressed four main areas, including:

1) the concepts, scope and principles underlining strategy formulation and performance measurement in the manufacturing context;
2) the key strategy determinants and performance criteria for manufacturing businesses;
3) the design, planning, and implementation of a PM system;
4) the integration of strategy formulation and the measurement initiatives and its impact on performance improvement in manufacturing enterprises.

1.5.2 Conduct of empirical study

An empirical study was conducted to ascertain the emphasis on strategy planning attributes, the barriers and problems encountered, and the initiatives of strategy formulation and performance measurement in manufacturing enterprises. Two questionnaire surveys

were conducted in Hong Kong and Shanghai with a further series of interviews performed in Hong Kong. The survey part obtained the management views on the determinants and factors affecting the strategy choices and performance measures in manufacturing enterprises. The questionnaire was designed in both English and Chinese languages. To facilitate the statistical analysis process, most questions required the respondents to rate answer with a five-point Likert scale of measurement. The decoding and categorising procedures were performed with the aid of the Statistical Package for Social Science (SPSS). The survey was initially conducted in Hong Kong, and then was repeated in Shanghai. Findings from respondents in both cities were contrasted, and the empirical analyses were compared.

The subsequent stage comprised two series of interviews. The first series identified the strategy determinants and performance criteria. The technique of analytic hierarchy process (Saaty, 1994a, 1996) was adopted, and computer software (i.e. Expert Choice) was used to help diagnose the findings. Senior executives and/or their representatives of the responding companies, who have participated in the former survey in Hong Kong, were interviewed. The second series investigated strategy choices and performance criteria drawing upon the success experiences of selected leading organisations in Hong Kong. These included interviews with senior executives from four past winners and certificate of merit holders of the Hong Kong Award for Industry. Four industry experts and representatives from government departments were also invited. The interviews used a semi-structured instrument of open-ended and closed-end questions to acquire their views and empirical data.

1.5.3 Development of an integration model

The research developed a generic model of SF/PM Integration (SPI) using the findings from literature review and the empirical study. The model was composed of five *enablers* and *results* categories of SF/PM criteria. These were primarily designed for assisting organisations with self-assessments of their performance on an ongoing basis. The research also devised a self-assessment scoring method to help manufacturing enterprises to quantify their performance improvement, and developed a 5-stage process framework for guiding the implementation of the proposed model in manufacturing enterprises. In order to evaluate the applicability of the model, a post-evaluation survey was conducted to gather views from respondents who had participated in the survey and personal interviews.

1.6 Outline of the Thesis

This thesis has nine chapters. ***Chapter One*** provides a brief introduction and background to the research. The aims and objectives of the research are presented together with a discussion of its scope and limitations. The chapter then describes the research focus and elaborates the methodologies for the research. ***Chapter Two*** addresses the issues of the conceptualisation of 'strategy' and the relationship between of strategic planning and strategy formulation. The chapter goes on to discuss the determinants of strategy formulation and deployment in the manufacturing context. It then describes the key features of selected conceptual frameworks and tools, and comes up with a synergy model for manufacturing strategy formulation and configuration.

Chapter Three reviews the concepts and principles of performance measurement. It then discusses the application of various approaches and tools to measure performance and explores the needs of establishing a viable performance measurement system. The integration between PM and quality management philosophy is addressed with respect to the guiding principles advocated by business excellence models (e.g. the Malcolm Baldrige National Quality Award (NIST, 2002) and the European Quality Award (EFQM, 2002)). A holistic link between PM and strategy development and deployment is explained, along with the identification of performance attributes and deployment of processes and strategies using quality function deployment and *Hoshin Kanri* techniques. ***Chapter Four*** discusses the challenges of manufacturing enterprises by cross-reference to the industrial developments in Hong Kong and Shanghai. It reviews the strengths and opportunities *vis-a-vis* the weaknesses and threats facing manufacturing enterprises in both cities. This chapter discusses the pressing need to investigate the impact of integrating SF and PM on performance improvement in manufacturing enterprises.

The following three chapters address the design and conduct of an empirical study on strategy formulation and performance measurement in manufacturing enterprises. ***Chapter Five*** explains the rationale, scope and methodologies of the empirical study. The designs of research instruments used in the surveys and interviews are elaborated. In addition, the methods of sample selection, data collection and analysis are discussed. ***Chapter Six*** incorporates the empirical findings from two surveys conducted in Hong Kong and Shanghai. The investigation of success factors, problem areas, strategy choices, and performance determinants in manufacturing industries is presented. ***Chapter Seven*** reports the interview findings about the identification of a list of strategy determinants and performance criteria in manufacturing enterprises. The chapter also discusses the experiences of four leading companies and four

industry experts in Hong Kong on aligning strategy choices and performance measures for safeguarding performance in manufacturing enterprises.

Chapter Eight addresses the integration issues of strategy formulation and performance measurement in manufacturing enterprises. It describes the development of the proposed integration model, and explains a self-assessment scoring method and a five-stage process framework. The chapter discusses the results of a post-evaluation survey with acquired comments from industry practitioners on the applicability of the model. In ***Chapter Nine***, this thesis draws conclusions about the research and makes a contribution by affirming the importance of SF and PM initiatives in organisational learning and performance improvement processes. The model helps manufacturing enterprises to build a self-assessment platform for amalgamating strategies, plans and actions. The chapter also gathers insights and makes recommendations for future research on manufacturing strategy formulation and performance measurement.

Chapter 2

Strategic Planning and Strategy Formulation Practices in Manufacturing

2.1 Introduction

Research into strategic planning and dynamic strategy formulation and implementation has become a major focus of academia and industry to improve manufacturing. This is because, with the accelerating dynamics of competition, the key to competitiveness no longer lies in employing strategies that have been successful in the past or emulating the strategies of successful competitors (Feurer and Chaharbaghi, 1995c; Mintzberg *et al.*, 1998). Practitioners, researchers and scholars have proposed different planning frameworks and methodologies pertinent to the design and management of the strategy formulation practices in organisations. In order to identify the properties of an effective manufacturing strategy process, this chapter reviews the issues surrounding the conceptualisations of strategy, strategic planning and strategy formulation in the manufacturing context. It then discusses the determinants and the 'reactive/proactive' dimension of strategy, and explores the obstacles to the implementation of strategic decisions. The chapter goes on to describe the characteristics of ten selected planning frameworks and methodologies, and come up with a synergy approach of manufacturing strategy formulation. The objective of this chapter is to identify general principles and determinants of manufacturing strategy, which can be applied to strategy formulation and deployment for performance improvement in manufacturing enterprises.

2.2 Conceptualisation of Strategy

There are a number of complexities, misunderstandings and issues surrounding the conceptualisation of strategy (Hutchinson, 2001). The Greek origin of the term strategy, *strategia* means the art of war (Feurer and Chaharbaghi, 1995a). In military terms, *strategy* refers to 'the important plan'. Where the objective is to defeat the enemy, the strategy will be to deploy the resources available in a manner that is likely to achieve the aim. In a business environment, the concept of strategy has evolved over time. For instance, Chandler (1962) defines strategy as "the determination of the basic long-term goals and objectives of an enterprise, the adoption of course of action and the allocation of resources necessary for carrying out these goals." Ansoff (1976) defines strategy as "the selection of product mix and markets" oriented toward the achievement of "an impedance match between the firm and the environment". Hofer and Schendel (1979) regard strategy as the mediating force or match between the organisation and the environment. Given a variety of legal constraints and the existence of competitors, Evered (1983) suggests that strategy is "a process for generating viable directions that lead to satisfactory performance in market place." Mintzberg (1994a) defines a strategy as "a plan, or something equivalent - a direction, a guide or course of action into the future, a path to get from here to there", and as "a pattern, that is, consistency in behavior over time."

The 'process school' view strategy as the outcome of three different processes (Bower and Doz, 1979; Mintzberg, 1994a). They are 1) the cognitive processes of individuals where the rational understanding of the external environment and internal capabilities of the firm reside; 2) the social and organisational processes contribute to internal communication and the

development of a consensus of opinion; and 3) the political processes that address the creation, retention and transfer of power within the organisation. Meanwhile, Hax and Majluf (1996) identify nine critical dimensions that contribute to a unified definition of strategy. These dimensions that underline a strategy are:

1) a means of establishing the organisational purpose in terms of its long-term objectives, action programs and resource allocation priorities.
2) a definition of the competitive domain of the firm.
3) a response to external opportunities and threats, internal strengths and weakness, in order to achieve a sustainable competitive advantage.
4) a way to define managerial tasks with corporate, business and functional perspectives.
5) a coherent, unifying and integrative pattern of decisions.
6) a definition of the economic and non-economic contribution the firm intends to make to its stakeholders.
7) an expression of strategic intent (i.e. to stretch the organisation).
8) a means to develop the core competence of the organisation.
9) a means of investing in tangible and intangible resources to develop the capabilities that assure a suitable advantage.

Mintzberg (1994) argues that strategies are intentional and their implementation deliberate before they become realised. Intentional strategies that are not realised are thus discarded. According to Grünig and Kühn (2001, p.7), it is rarely possible to realise intended strategies completely, and so the realised strategies normally diverge to a greater or lesser extent from the intended strategies. Additionally, in some cases companies do not have any specified intended strategy. The realised strategy is thus the product of many different decisions taken

individually. Therefore, strategies may be unintentional or emergent, i.e. they simply emerge from the things that an organisation does (Mintzberg and Waters, 1984; Segal-Horn, 1998). The conceptual forms of strategy are illustrated in figure 2.

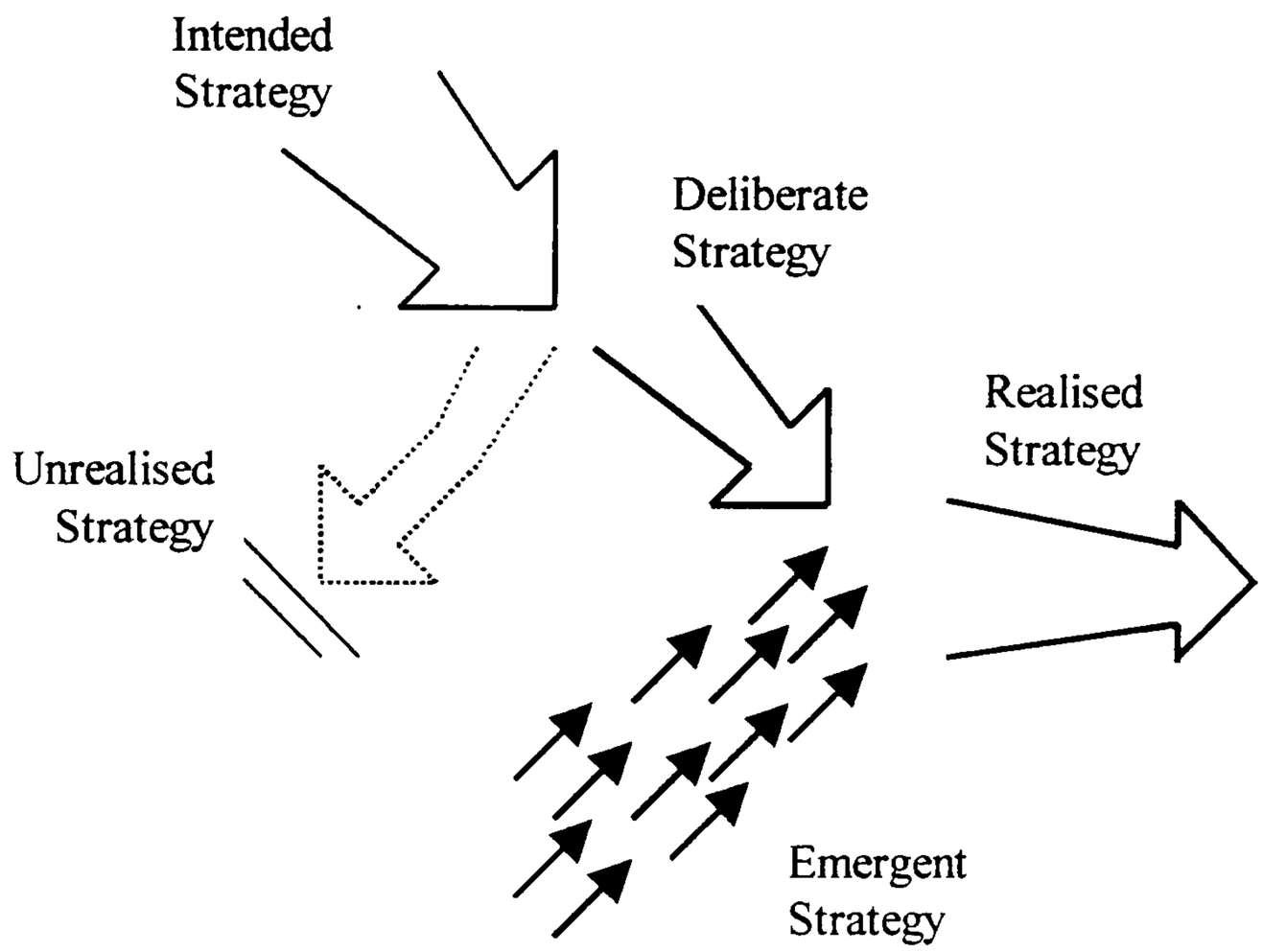

Figure 2. Basic forms of strategy
Source: Based on Maloney (1997, p.51)

Strategy exists at multiple levels (Hills, 1997; Johnson and Scholes, 1997; Segal-Horn, 1998). The level of strategy can be classified as corporate, business and functional. Firstly, *corporate* level strategy concerns the market sectors in which a company decides to compete, the degree of importance it attaches to each sector and the priority given to each sector in terms of investment and other resource allocations (Hills, 1997). Secondly, *business* level strategy is related to how an organisation approaches a particular market or

activity. This concerns identifying the markets in which each of the several businesses competes and the dimensions of competition involved (Hills, 1997). Thirdly, *functional* level strategies are those made at operational levels, such as personal policy, pricing and advertising strategies. This concern investing in and developing the necessary capabilities of different functions to support those factors in a company's markets on which it competes (Hax and Majluf, 1996; Hills, 1997, Johnson and Scholes, 1997).

Recent strategy literature acknowledged the distinction between content (i.e. what the decisions and actions are) and process (i.e. how those decisions and actions come about) (e.g. see Barnes, 2001; Bozarth and McDermott, 1998; Dangayach and Deshmukh, 2001; Minor *et al.*, 1994). The content relates to the distinct elements of the strategic plan which differ from firm to firm (O'Regan and Ghobadian, 2002a). Content-related literature stresses issues of competitive priorities, which includes cost, quality, delivery speed and dependability, flexibility and innovation aspects. On the other hand, a process is a pattern or procedure in which strategy is developed and implemented (Dangayach and Deshmukh, 2001; Pettigrew, 1992). It relates to the mechanisms for the development and subsequent deployment of the strategic plan (O'Regan and Ghobadian, 2002a). Mintzberg (1994a) identified three main types of strategy processes: planning, entrepreneurial and learning-by-experience. Table 1 presents the three main types of strategy processes together with a summary of their key characteristics. While both content and process are separate elements of strategy formulation, they are highly interdependent. The interrelationship is seen as so significant that a consideration of the content of strategy in the absence of the strategic process means that only a limited view is obtained (Mintzberg, 1973, 1990). Moreover, others contend that it is impossible to consider one without the other (Hinterhuber and Popp, 1992). Hax

and Majluf (1996) argue that a strategy becomes a fundamental framework through which an organisation can simultaneously assert its vital continuity and facilitate its adaptation to a changing environment. Individual organisations have to determine the content and the process of their strategies in the light of their position in the industry and their objectives, opportunities and resources (Barnes, 2001; Kotler, 2000).

Table 1. Main types of strategy process

Planning	**Entrepreneurial**	**Learning-by-experience**
Fully conscious and controlled thought process	Semi-conscious process	Strategy is evolutionary process of repetitive nature
Results relatively standardised	Long experienced and deep insight enables formulation of visions and strategy	Pattern of impulses from insider and outside during implementation of strategy
Fully developed strategic plans are followed by timed implementation	Vision informal and personal to preserve flexibility	Arise from dynamics of organisation and directly influence behaviour

Sources: Based on Feurer and Chaharbaghi (1995a, p.17)

For instance, Pettigrew and Whipp (1991) advocate a framework of analysis to examine the importance of the strategy development process, its content and the context within which strategy is developed. This framework comprehends many aspects of strategy and the inter-relatedness of factors/determinants that affect strategy formulation and execution (see table 2). The framework proposes that these factors be overlain by a multi-level approach, and this would be at the firm, sector and national context (Hutchinson, 2001).

Table 2. Pettigrew and Whipp's Trinity of forces

Forces	**Components of forces**
Process	• Change managers • Models of change • Formulation and implementation • Pattern through time
Content	• Assessment and choice of products and markets • Objectives and assumptions
Context: Internal/Inner	• Resources • Capability • Culture • Politics
External/Outer	• Economic/business • Political • Social

Sources: Abstracted from Hutchinson (2001, p.270)

Moreover, Barnes (2002) stresses the content of business and manufacturing strategies, and incorporates external factors and ownership factors in his study of the complexities of the manufacturing strategy formation process. These are elaborated as follows:

- *Internal context.* This includes the hard internal contextual factors, such as the firm's resources and capabilities and the soft factors like culture, politics and leadership, equating to Pettigrew and Whipp's (1991) "inner context".

- *External context.* This broadly equates to Pettigrew and Whipp's (1991) "outer context" and includes political, economic, sociological and technological factors in the wider business environment.

- *Content - Business Strategy.* This is concerned with the direction and scope of the organisation's activities over the long term (Johnson and Scholes, 1999), including

the company's objectives, its marketing, product and financial strategies, the interrelationships between these and its manufacturing strategy, and how these have changed over time. This is evidenced by strategy as realised rather than as intended, and will thus comprise the emergent as well as the deliberate.

- *Content - Manufacturing strategy.* This is concerned with realised strategic manufacturing decisions and actions, classifying them as either structural (e.g. capacity, facilities, production equipment vertical integration) or infrastructural (e.g. production planning and control, quality, organisation, human resources, new product development and performance measurement systems) elements.
- *Ownership factors.* The attitudes of its owners are likely to impact on a company's business strategy. They may have particular financial goals that may be manifested in their attitude to the timing of returns, and to the level of risk they are prepared to tolerate. They may also have non-financial goals for the company. Besides, their attitudes towards manufacturing may directly impact on manufacturing decisions and actions.
- *External factors.* The key factors in the firm's operating environment that individually, or collectively, impact its business strategy, or manufacturing strategy, or both. These stem from the requirements of the customers and potential customers in its market the activities of the competitors in its industry and factors in its supply market, particularly for labour, materials and equipment including the impact of available technology (Barnes, 2002).

2.3 From Strategic Planning to Strategy Formulation

2.3.1 About strategic planning

The terms 'strategic planning', 'corporate planning' and 'long-range planning' are often used interchangeably. To avoid confusion, this research uses strategic planning as a generic term that has all common features of corporate planning and long-range planning. Johnson and Scholes (1997) encapsulate the meaning of strategic planning as the direction and scope of an organisation over the long term that achieves advantage for the organisation through its configuration of resources within a changing environment, to meet the needs of markets and to fulfill stakeholder expectations. Strategic planning is concerned with the setting of corporate goals, the making of strategic decisions and the development of plans necessary to achieve them (Sethi and King, 1998; Hewlett, 1999). As the environment is continually changing, it is necessary for strategic planning to continually change in order to maintain a 'balance' or 'fit' with the external environment (Wright *et al.*, 1996; Proctor, 1997). Some selected connotations of strategic planning in the literature are given in table 3.

In the 1960s and 1970s, Ansoff (1965) and Andrews (1971) laid the foundations for strategic planning by demonstrating the need to match business opportunities with organisational resources and illustrating the usefulness of strategic plans. Using a uni-directional approach, the strategic planning processes entail a number of well-defined steps carried out in sequence including data collection and analysis, strategy development, evaluation, selection and implementation. The process explores a variety of critical variables and suggests possible cause-

and-effect relationships that impact on the operational and business performance of a firm (Mintzberg and Lampel, 1999). This helps an organisation assess its current and future position, identify critical factors and find methods of assuring success (Bailey and Avery, 1998).

Table 3. Selected connotations of strategic planning since the 1970s

Authors	Connotations of Strategic Planning
Andrew (1971)	A process of funding a match between organisation capabilities and opportunities within the competitive environment
Drucker (1977)	A continuous process of making entrepreneurial decisions systematically and with the best possible knowledge of their futurity; organising systematically the effort added to carry out the decisions and measuring the results against expectations through organised systematic feedback
Argenti (1980)	A systematic and disciplined study designed to help identify the objective of any organisation or corporate body, determine an appropriate target, decide upon suitable constraints, and devise a practical plan by which the objective may be achieved
Evered (1983)	A process for generating viable directions that lead to satisfactory performance in the market place, given a variety of legal constraints and the existence of competitors
Bean (1993)	A process of determining the long-term vision and goals of an enterprise and fulfilling them
Hax and Majluf (1996)	A disciplined and well-defined organisational effort aimed at the complete specification of a firm's strategy and the assignment of responsibilities for its execution
Hewlett (1999)	A process by which firms derive a strategy to enable them to anticipate and respond to the changing dynamic environment in which they operate
Kotler (2000)	The managerial process of developing and maintaining a viable fit between the organisation's objectives and resources and its environmental opportunities
Grünig and Kühn (2001)	It is a systematic process which defines the way to guarantee the permanent accomplishment of the company's overriding goals and objectives

Until the 1980s, strategic planning was perceived as the critical management function in business organisations (Mintzberg, 1994a; Maloney, 1997). Then, for a period, it fell in perceived importance as management shifted its attention to improving quality, restructuring,

downsizing and reengineering. In the 1990s, the pendulum had swung again and strategic planning was returning to its former prominent position (Maloney, 1997). Many recent studies have shown that organisations engaged in strategic planning always outperformed those that have no formalised planning systems (Hayes and Upton, 1998; Lyles *at al* 1993; Pilkington, 1998). The deployment of strategic planning is altered where there is a changed perception of the problems faced by management. Nevertheless, its central theme continues to concern the future and formulate strategies to attain the multiplicity of organisational objectives and goals (Ansoff and McDonnell, 1990).

2.3.2 About strategy formulation

According to Hax and Majluf (1996), there are basically two schools of management pertaining to strategy formulation. One School relies heavily on formal-analytical process while the other espouses a power-behavioral approach to strategy formulation. Those favouring the former approach tend to advocate the use of formal planning systems, management control and consistent reward mechanisms to increase the quality of strategic decision-making (Ansoff and McDonell, 1990). They regard strategy formulation as a formal and disciplined process leading to a well-defined organisation-wide effort aimed at the complete specification of corporate, business and functional strategies. The latter rests on the behavioural theory of the firm, and emphasise multiple goal structures of organisations, the politics of strategic decisions, executive bargaining and negotiation (Hax and Majluf, 1996). Strickland and Thompson (1998) argue that strategy formulation has a strongly entrepreneurial character in the sense that managers

have to choose among alternative strategies and to pursue approaches, and this entails at least a small amount of adventureness and risk-taking.

Hax and Majluf (1996) argue that strategy formulation is one of two major cycles in strategic planning that intended to frame all of the key strategic issues of a firm through a sequential involvement of the corporate, business and functional perspectives. Pearce and Robinson (1998) add that strategy formulation involves the generation of a set of potential strategies from which the firm selects the ones that have the greatest likelihood of leading to the attainment of its objectives. The SF process would affect the second cycle of strategic and operational budgeting that deals with the final definition and subsequent consolidation at corporate level of the budgets for all the businesses and functions of the firm (Hax and Majluf, 1996). The budget constitutes the legitimate output of this process, since it represents the commitments for strategy implementation. In delineating SF responsive to a firm's needs, Hax and Majluf (1996) suggest eight relevant dimensions. These include:

1) The openness and breadth to communicate strategy, both internally in the organisations and to all relevant external constituencies;
2) The degree to which different organisational levels participate;
3) The amount of consensus built around intended courses of action, especially the depth of senior management involvement in this effort;
4) The extent to which formal processes are used to specify corporate, business and functional strategies;
5) The incentives provided for key players to negotiate a strategy for the firm;
6) The linkage of strategy to the pattern of actions in the past;
7) The use of strategy as a force for change and as a vehicle for new courses of action; and

8) The degree of a strategy that is either purely deliberate or purely emergent.

2.4 Operationalising Strategy Formulation

2.4.1 Strategy determinants

There is evidence that ineffective deployment of strategic planning is often one of the main reasons for the failure to achieve expected or projected performance in many companies (e.g. Ansoff and McDonnell, 1990; Asch and Bowman, 1989; Mintzberg, 1994a,b; Noble, 1999). Dean and Sharfman (1996) argue that deployment can have a significant influence on the final outcome and effectiveness of strategy. However, Alexander (1985) claimed that the overwhelming majority of the literature has been on the formulation side of the strategy and only lip service has been given to strategy implementation or deployment. Pettigrew and Whipp (1991) add that strategic planning is not just a matter of formulation, but it also includes how people interpret and deploy the strategic plan. A report by Deloitte and Touche (1992) suggests that eight out of ten companies fail to deploy their strategies effectively. What are then the determinants of and obstacles to strategy formulation and deployment?

Strategy formulation would be a routine task, if a company can know in advance the strategies of competitors, forthcoming legislations and price changes by suppliers (Chin and Pun, 2001). However, it is difficult to predict any of these environmental changes and their impact on corporate objectives. Enormous literature investigates business strategy and

its relationship to factors like environment, technology and firm structure (McNamee, 1990; Mintzberg *et al.*, 1998; Porter, 1998). Many researchers have adopted a number of independent characteristics, factors, obstacles and problems to delineate the strategy formulation and development processes (e.g. Lingle and Schierniann, 1994; O'Regan and Ghobadian, 2002b; Pun *et al.*, 2000a; Tregoe *et al.*, 1989). For instance, Tregoe *et al.* (1989) use eight key variables as driving forces to generate a strategic vision, determine the critical success factors and identify the problematic areas. These variables include: product and services offered, markets served, return, profit, technology, low-cost production, operations capability, method of distribution, sale and national resource. Lingle and Schierniann (1994) found that there are six areas of vital importance to long-term successful strategy implementation. These areas are: market, personal, finance, operation, adaptability, and environment. O'Regan and Ghobadian (2002b) also incorporate internal environment functional integration, the use of analytical techniques, resources for the strategic planning process, systems capability and creativity, and a focus on control into the external environment. Some other researchers and practitioners advocate the employment of core skills (Irvin and Michaels, 1989), core competences (Prahalad and Hamel, 1990) and capabilities (Stalk *et al.*, 1992) that help a company point to what it must do to formulate and deploy strategy.

The author had conducted a longitudinal study of planning practices in manufacturing enterprises in Hong Kong, and identified a list of twenty common success factors and twelve problem areas for manufacturing businesses as shown in table 4 (Pun, 1998; Pun *et al.*, 2000a). Furthermore, many studies shed lights on corporate culture as an influential factor of strategy formulation and deployment in organisations (Martinsons, 1996; Sinclair and

Collins, 1994; Watt, 1999). According to Mintzberg *et al.* (1995), culture is made up of intangible things that are shared by the people in the organisation. These are concerned with values, beliefs that guide action, understandings, and even ways of thinking. Strickland and Thompson (1989) argue that the stronger a company's culture, the more that culture is likely to shape the strategic actions it decides to employ, sometimes even dominating the choice of strategic moves. This is because culture-related values and beliefs are so embedded in management's strategic thinking and actions that they condition how the enterprise responds to external events.

Table 4. Common success factors and problem areas for manufacturing businesses

Success Factors	Problem Areas
1. Accessibility to markets	1. Cash flow problems
2. Availability of funds and capitals	2. Effects of protectionism
3. Availability of workforce	3. Few current and potential markets
4. Company's location	4. Few suppliers and/or vendors
5. Company's mission	5. High employee turnover
6. Company's policies	6. Increasing production cost
7. Company's reputation	7. Insufficient research and development
8. Company's strategies	8. Keen local competition
9. Costs of production and operations	9. Lack of government support
10. Customer services	10. Low productivity (including poor people morale)
11. Employee involvement	11. Political influence
12. Information technology/system	12. Strong overseas competitors
13. Management commitment and communication	
14. Market share	
15. Market positioning	
16. Materials supply	
17. Product mix and range	
18. Product/service quality	
19. R&D/Innovation capabilities	
20. Workforce skills/abilities and training	

Sources: Based on Pun (1998) and Pun *et al.* (2000a)

2.4.2 Reactive/proactive dimension of strategies

Many studies and research have recently been undertaken to investigate the proactive and reactive approaches of strategy formulation in organisations (Cardozo *et al.*, 1992; Cravens *et al.*, 2000; Chin and Pun, 2000, 2001; Lindman, 2002; Segal-Horn, 1998). For instance, Cardozo *et al.* (1992) states that firms in many industries are seeking proactive strategic partnerships with suppliers, distributors and customers. Lindman (2002) argues that many small- to medium-sized enterprises (SMEs) are apt to rely on reactive and closed new product strategies based on a study in the Finnish metal industry. Even if successful in the past, such strategies risk being unable to identify and take advantage of any business opportunities outside the present product scope. Chin and Pun (2000) contend that the proactive strategy stresses the initiatives of new product development with outstanding technical features that satisfy strong marketing needs. For the adoption of proactive approach, a firm attempts to explicitly allocate resources to identify and seize opportunities. It would concentrate on technology, research and development (R&D), and consumer marketing. The approach preempts competition by being the first to the markets with innovative products that competitors have difficulty of matching (e.g. Sony). On the other hand, the reactive approach relies largely on imitating the success of leading companies and their products in markets (Chin and Pun, 2000). A firm waits until its competitors successfully introduce their products, and attempts to imitate them or develops similar products with modifications accordingly (Kotler, 2000; Segal-Horn, 1998).

Pun *et al.* (2000a) argues that 'proactive/reactive' is one of legitimate dimension of strategy for formulation and suggests a list of common proactive- and reactive-oriented

strategies as depicted in table 5. Arguably, many of these strategies are neutral and can be proactive or reactive in application. For instance, 'joint ventures' and 'product-line extension' can be reactive-oriented, while 'vertical integration' can be proactive-oriented, and *vice versa*. It is rather difficult to classify these strategies strictly on 'proactive/reactive' dimension, but would rely largely on the specific business and operations circumstances with which individual firms are facing.

Table 5. Common proactive- and reactive- oriented strategies

Proactive-oriented Strategies:	**Reactive-oriented Strategies:**
• Horizontal integration	• Business withdrawal or divestment
• Market development	• Importing technologies
• Market diversification	• Importing workforce
• New business development	• Joint ventures
• New product development	• Product-line extension
• Product diversification	• Product modification
• Production automation	• Product/service quality improvement
• Staff education and training	• Related business development
• Strengthening R&D	• Selective investments
• Vertical integration	• Sub-contracting

Sources: Based on Pun (1998) and Pun *et al.* (2000a)

Successful companies encounter unique competitive challenges. The determination and adoption of 'proactive/reactive' strategies would depend variably with corporate mission, business goals and nature, competitive position, organisational resources and constraints of an organisation (Pun *et al.*, 2000a). Cravens *et al.* (2000) argue that key strategy initiatives would include the leveraging the business design, recognising the growth mandate, developing market vision, achieving a capabilities/value match, exploring strategic relationships, building strong products, and recognising the advantages of proactive cannibalisation. Moreover, Chin

and Pun (2000) identify four groups of decision criteria pertaining to determination of proactive or reactive strategy relative to the needs of individual organisations. These criteria include:

1. *Corporate Strengths* - This decision criterion is concerned with the overall strategic posture, and addresses management commitment, company's mission and policies and availability of funds and capitals.
2. *Marketing Strengths* – Such factors as the accessibility to markets, market positioning, company's reputation, and product/service quality always constitute the integral part of marketing that determines a company's strategies.
3. *Technology Strengths* – Organisations can have stronger competitive advantages to strengthen their operational capabilities and efficiency with technological R&D, and information technology and systems.
4. *Operational Strengths* – This covers company's location, workforce skills/abilities and costs of production/operation in relation to a firm's operations.

2.4.3 Obstacles to the implementation of strategic decisions

Wessel (1993) states that most of the barriers to strategy implementation that have been encountered fit into one of the following interrelated categories: 1) too many and conflicting priorities, 2) the top team does not function well; 3) a top-down management style; 4) inter-functional conflicts; 5) poor vertical communication, and 6) inadequate management development. Eisenstat (1993) indicates that most companies attempting to develop new organisation capacities stumble over common organisational hurdles such as

competence, coordination and commitment. McGrath *et al.* (1994) indicates that the political turbulence may well be the single most important issue facing any implementation process. Sandelands (1994) also argues that people underestimate the commitment, time, emotion, and energy needed to overcome inertia in their organisation and translate plans into action. Al-Ghamdi (1988) extends Alexanders' (1985) study and identifies a list of recurring strategy implementation problems as depicted in table 6. The study findings contend that communication, management support, and good information system are the key tools for smooth implementation processes.

Table 6. Fifteen potential strategy implementation problems

1. Took more time than originally allocated
2. Major problems surfaced which had not been identified earlier
3. Coordination of implementation activities was not effective enough
4. Competing activities distracted attention from implementing this decision
5. Capabilities of employees involved were insufficient
6. Training and instruction given to lower level employees were inadequate
7. Uncontrollable factors in the external environment had an adverse impact on implementation
8. Leadership and direction provided by departmental managers were inadequate
9. Key implementation tasks and activities were not sufficiently defined
10. Information systems used to monitor implementation were inadequate
11. Advocates and supporters of the strategic decision left the organisation during implementation
12. Overall goals were not sufficiently well understood by employees.
13. Changes in responsibilities of key employees were not clearly defined
14. Key formulators of the strategic decision did not play an active role in implementation
15. Problems requiring top management involvement were not communicated early enough

Source: Abstracted from Al-Ghamdi (1998, p.323)

2.5 Models and Frameworks for Strategy Formulation

During the 1970s and 1980s, many studies culminated in a large number of strategy tools and methodologies that are still used for analysis purposes today (Feurer and Chaharbaghi, 1995a). For instance, these included the SWOT (strengths, weaknesses, opportunities and threats) analysis (Lindgren and Spangberg, 1981), the PIMS (profit impact of marketing strategy) principles (Buzzell and Gale, 1987), the Boston Consulting Group's (1973) market growth/market share matrix, the McKinsey and Company's (1986) market attractiveness/strategic position matrix and 7S framework, Hax and Majluf's (1984) ADL life-cycle matrix, Lorange's (1975) divisional planning matrix, and Harrigan and Porter's (1983) end-game analysis. In parallel, researchers and scholars have proposed many planning models and strategy frameworks that assisted organisations in identification of competitive threats and new opportunities (Earl 1989; Feurer and Chaharbaghi, 1995a). These models and frameworks provide a set of diversified aids and references for organisations to formulate and deploy their strategies.

Earl (1989) classifies the planning models and frameworks into two categorises. The first category stresses strategic positioning that helps organisations to assess the strategic importance of their situations in the marketplace. The models aim at improving the understanding of the current system functions and showing how they should be managed in organisations. McFarlan and McKenney's (1983) strategic grid and Earl's (1989) strategic impact or expectancy model are typical examples. The second category is to identify strategic opportunities that help organisations to develop vision, reorient thinking and identify strategic possibilities for the current systems. Examples include Porter's (1980)

competitive forces model, Benjamin *et al.*'s (1984) strategic opportunities framework, Porter and Millar's (1985) competitive advantages framework, and Wiseman's (1988) strategic option generator.

With the increasing level of competition in many competitive environments, a body of research regards the ability to implement a formulated strategy as an equally important source of competitive advantage (Engelhoff, 1993; Piest and Ritsema, 1993). Venkatraman (1991) proposes an IT-induced reconfiguration model which analyses the technology-strategy connection and establishes the architecture for various level of strategic transformation. The reconfiguration model has later been modified by Burn (1997) to access potential impact of any practices and systems. Moreover, Henderson and Venkatraman (1992) developed a strategic alignment model that identify the key components for strategic business alignment and examine their impact on the alignment process. Based on Pettigrew and Whipp's (1991) 'process-content-context' framework of strategy, Mills *et al.* (1995) proposes a contingency framework for reviewing and analysing the strategic roles and factors relevant to the design of a manufacturing strategy process. Based on the findings of a longitudinal study of planning practices in manufacturing enterprises in Hong Kong, Pun *et al.* (2000a) also develop a strategy configuration model to configure seven core strategy elements.

Over the years, researchers identified many strategy process types through both empirical and theoretical research, culminating in a wide range of models and frameworks. A summary of the main features of ten selected planning models and frameworks for strategy formulation is given in table 7, and each of them is described separately in a chronological order below.

Table 7. Contrasting main features of selected strategy models and frameworks

Model/ Framework	Competitive Forces Model	Strategic Grid	Strategic Opportunities Framework	Competitive Advantages Framework	Strategic Option Generator	Strategic Impact Model	IT-induced Reconfiguration Model	Strategic Alignment Model	Contingency Framework	Strategy Configuration Model
Advocates	Porter (1980)	McFarlan and McKenney (1983)	Benjamin *et al* (1984)	Porter and Millar (1985)	Wiseman (1988)	Earl (1989)	Venkatraman (1991); Burn (1997)	Henderson and Venkatraman (1992)	Mills *et al.* (1995)	Pun *et al.* (2000a,b)
Categorises	Strategic Opportunities	Strategic Positioning	Strategic Opportunities	Strategic Opportunities	Strategic Opportunities	Strategic Positioning	Strategic Opportunities	Strategic Opportunities	Process-oriented	Process-oriented
Research **Orientation**	Theoretical	Theoretical	Theoretical	Theoretical	Theoretical	Theoretical	Theoretical and empirical	Empirical	Theoretical and empirical	Theoretical and empirical
Purposes	Identify five competitive forces	Conceptualise the ideas of competitive strategy	Conceptualise strategic potentials	Examine the linkage with competitive environment	Develop a competitive advantage from strategic thrusts	Analyse the competitive environment and strategies	Analyse the technology-strategy connection	Identify four components for strategic business alignment	Identify process, content and context of manufacturing strategy	Configure the process and seven core elements for strategy development
Main Features	1. Examine major forces and their impact; 2. Leverage differences in strategic resources and competitive forces	1. Assess current operations and systems; 2. Evaluate Strategic impact of new practices and systems	1. Evaluate major strengths and weaknesses of products, operations and systems; 2. Determine the need for any structural changes	1. Use the value-added chain for supporting strategic analysis; 2. Emphasise cost leadership, product differentiation and focused strategies	1. Work with competitive forces framework; 2. Identify strategic targets and Choose alternative strategic thrusts	1. Work with the competitive forces and the competitive advantage frameworks; 2. Identify current position and exploit possible opportunities	1. Establishes an architecture for various level of strategic transformation ; 2. Assess the potential impact of any practices and systems	1. Examine the impact on strategic alignment process 2. Determine the six cross-alignment relationships and identify any misfits	1. Analyse the strategic roles and factors relevant to the design of a strategy; 2.Stress the chosen content and the required qualities of outcome	1. Develop a configuration process and examine through the core elements; 2. Address the business alignment and transformation

2.5.1 Competitive forces framework

In the early 1980s, Porter (1980) identified five competitive forces, including suppliers, buyers, new entrants, substitute products and existing competitors (see figure 3). They have different effects on organisations, depending on ten factors: 1) potential rate of growth in the industry; 2) threat of entry by new competitors; 3) intensity of rivalry among existing competitors; 4) pressure from substitute products; 5) dependence on complementary products and services; 6) bargaining power of suppliers; 7) bargaining power of customers; 8) sophistication of the technologies applied in the industry; 9) rate of innovation within the industry; and 10) capability of management. A sustainable competitive advantage is determined to leverage differences in strategic resources and competitive forces. Therefore, a key to competitive analysis is the examination of these major forces and their impact on an organisation's current and future position. An industry and competitive analysis based on the framework would help managers and executives to formulate strategies in the competitive environment of their particular industry.

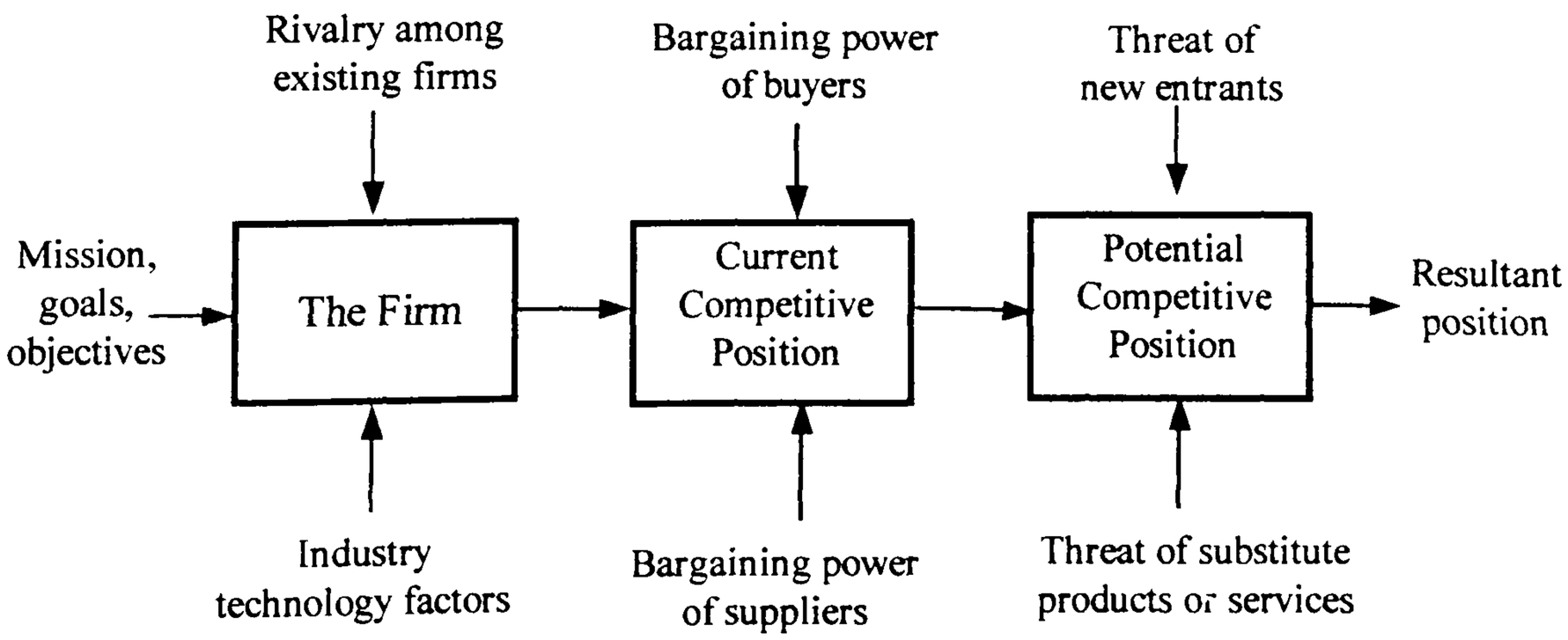

Figure 3. Competitive forces framework (Source: Adapted from Porter, 1980)

2.5.2 Competitive strategy framework

In 1983, McFarlan and McKenney (1983) conceptualised the ideas of competitive strategy to help an organisation build structural barriers, and used the value-added chain concept to determine where the organisation could exploit the competitive opportunities. McFarlan (1984) extends the competitive strategy framework with a strategic grid tool (see figure 4) that helps organisations assess their current operations and systems strategically. Using information technologies (IT) as an example, where IT is critical to current operations but not the heart of the company's strategic development, they may be seen as a *routine* activity that is critical to sustaining existing business. However, when IT is always crucial to the company's operation and the future is dependent on them, they may be seen as a *strategic* activity that is critical for the company's future success.

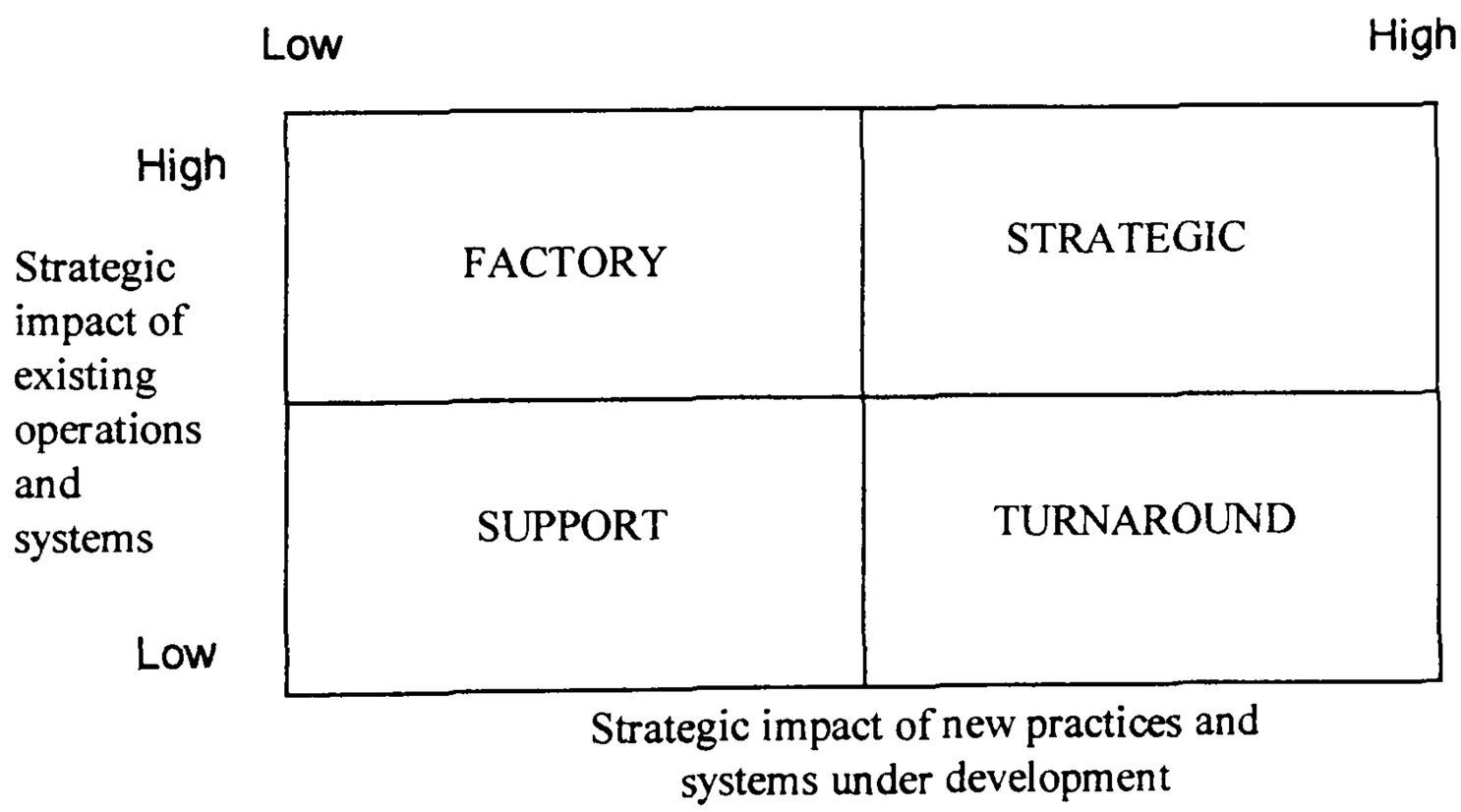

Figure 4. The strategic grid (Source: Adapted from McFarlan, 1984)

2.5.3 *Strategic opportunities framework*

In 1984, Benjamin *et al.* (1984) proposed a strategic opportunities framework to raise an organisations' awareness of the strategic potentials of their current products, operations and systems. This would determine the need for any significant structural changes. The strategic opportunities framework is depicted in figure 5. The horizontal axis is divided into internal and external operations in the competitive market place. The vertical axis is divided into new and traditional products and processes. This matrix framework would help an organisation identify the strategic opportunities based on its internal and external operations and evaluate major strengths and weaknesses of its products, operations and systems.

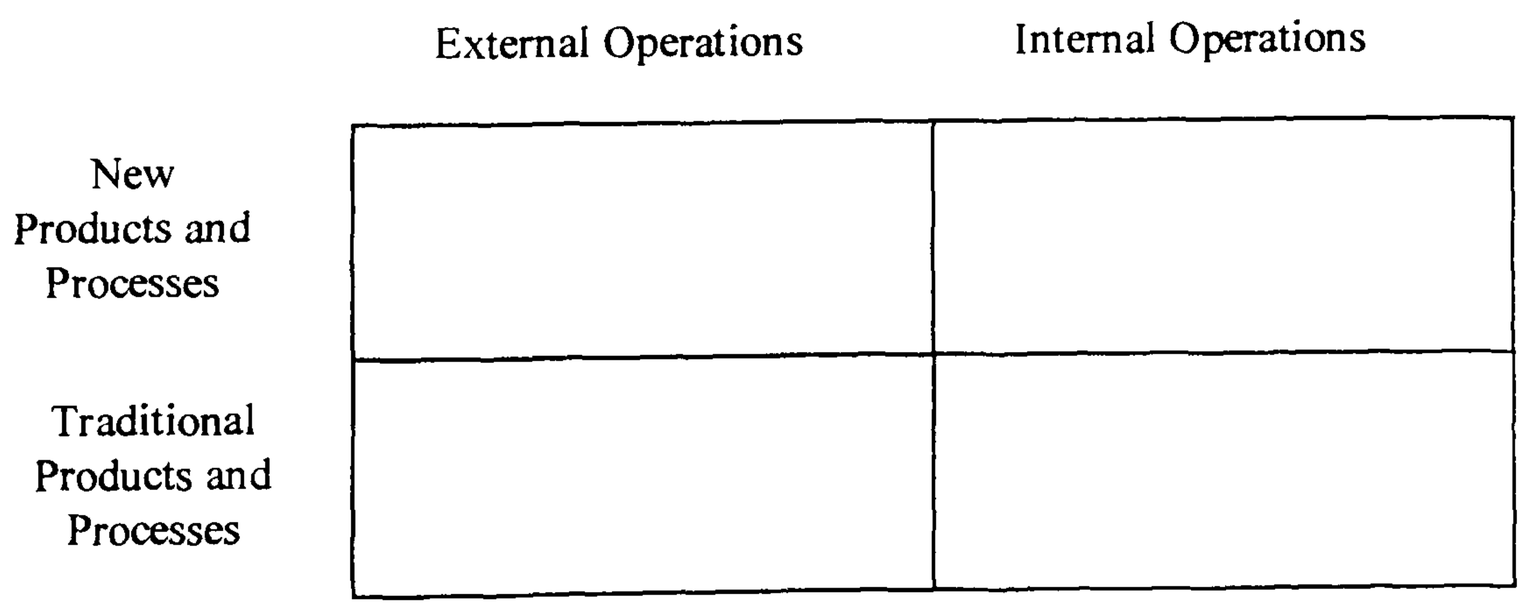

Figure 5. Strategic opportunities framework (Source: Adapted from Benjamin *et al.*, 1984)

2.5.4 Competitive advantage framework

In 1985, Porter and Millar (1985) proposed a competitive advantage framework to examine the linkage between the business unit activity and the competitive environment. The basis of the framework is that an enterprise exists within an industry and to succeed, it must effectively deal with the competitive forces that exist within the particular industry (Porter, 1980). The framework uses the value-added chain for supporting strategic analysis, emphasising cost leadership, product differentiation and focused strategies. This assists managers in analysing the competitive context of their business strategy and identify where the organisations may create a competitive advantage in defending against competitors. The framework requires detailed investigations into the sources and nature of the strategic forces, the feasible actions, as well as the likely industry reactions.

2.5.5 Strategic option generator

In 1988, Wiseman (1988) proposed a strategic option generator in line with the competitive forces framework. This methodology helps organisations create and develop a competitive advantage from strategic thrusts. It relies on a thorough understanding of the state of the industry, the firm's business strategy and competitive position, the determining factors for success, and the industry's value-added system. With the strategic targets (i.e. the suppliers, customers, and competitors) identified, the firm would choose alternative strategic thrusts including product differentiation, cost leadership, innovation, growth and alliances to attack or defend itself in the competitive arena (Porter and Millar, 1985).

2.5.6 Strategic impact model

In 1989, Earl (1989) proposed a strategic impact model (also known as an expectancy model) that stresses the recognition and analysis of the competitive environment and strategies. This model helps organisations identify their current position and exploit possible opportunities based on the competitive forces and the competitive advantage frameworks (Porter, 1980; Porter and Millar, 1985). For instance, a firm can focus on being a lower cost producer, on overall product differentiation, or on a niche market. Information technology can be used to leverage a particular position to combat competitors who are establishing entry barriers and switching costs, and those who are engaged in product differentiation strategies. This is a generic model and its parameters can be modified to evaluate the strategic impacts facing companies.

2.5.7 IT-induced reconfiguration model

Based on the MIT90's Research Programme, Venkatraman (1991) proposed that there be five levels of IT-induced reconfiguration for the technology-strategy connection. Levels 1 and 2 are evolutionary in that they are a natural development from the localised exploitation of IT application (i.e. level 1) to the internal integration of IT-based links in the organisation (i.e. level 2). Levels 3, 4 and 5 are revolutionary and do not follow a logical progression. Whereas level 3 concerns redesign of a business process within the organisation, level 4 stresses business network redesign involving other organisations that might be suppliers, customers, services or even competitors. Level 5 refers to extending the scope of business that the organisation is

involved in, usually by means of a new product. Burn (1997) extends the scope of the model by including two upper levels of external impact on organisational transformation and societal transformation (see figure 6). The model provides an architecture that assists managers in assessing the potential impact of any practices and systems (e.g. information technology) on their businesses.

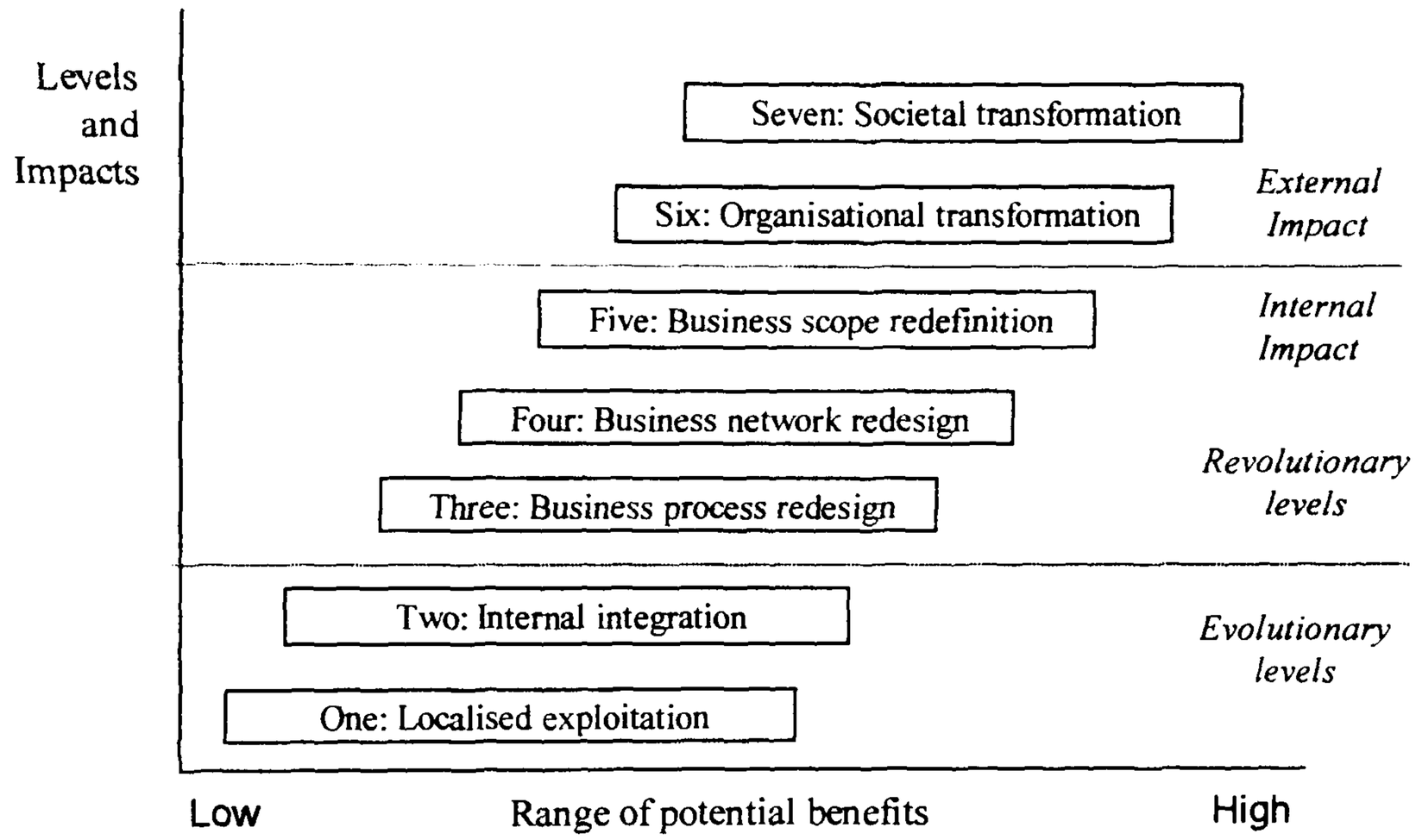

Figure 6. IT-induced reconfiguration model
Sources: Adapted from Venkatraman (1991) and Burn (1997)

2.5.8 Strategic alignment model

In 1992, Henderson and Venkatraman (1992) identified four components for strategic business alignment, namely business strategy, IT strategy, organisational infrastructure and processes and IT infrastructure and processes (see figure 7). Any of these components might be

the major focus for change in the strategic alignment process and would impact on the other components for cross-alignments. Management analyses the strategy based on external and internal alignments. The results are compared to determine the six cross-alignment relationships. Management can then identify from this where misfits occur and the extent of their impact on overall planning.

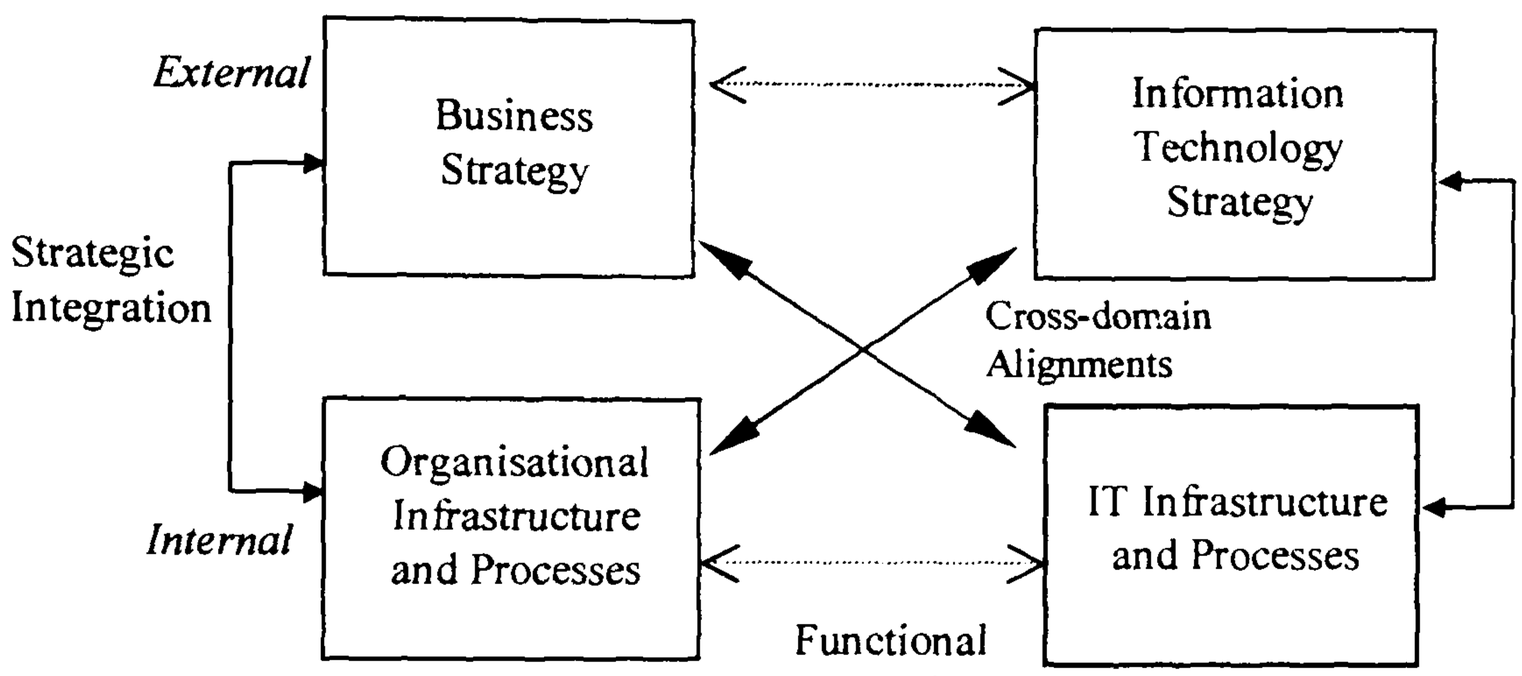

Figure 7. Strategic alignment model
Source: Adapted from Henderson and Venkatraman (1992)

2.5.9 Contingency framework for manufacturing strategy processes

Based on Pettigrew and Whipp's (1991) manufacturing strategy framework, Mills *et al.* (1995) proposes a contingency framework for reviewing and analysing the strategic roles and factors relevant to the design of a manufacturing strategy process (see Figure 8). The framework consists of 'process, content and context' of a strategy. Process refers to how a strategy is made while content is the constituents of the strategy. The context includes both

internal factors (e.g. the enterprise's structural, cultural and political facets) and external factors (e.g. sectoral, economic, social, political and competitive environments). The design of which is contingent on the content model(s) chosen and the required qualities of the outcome of the process.

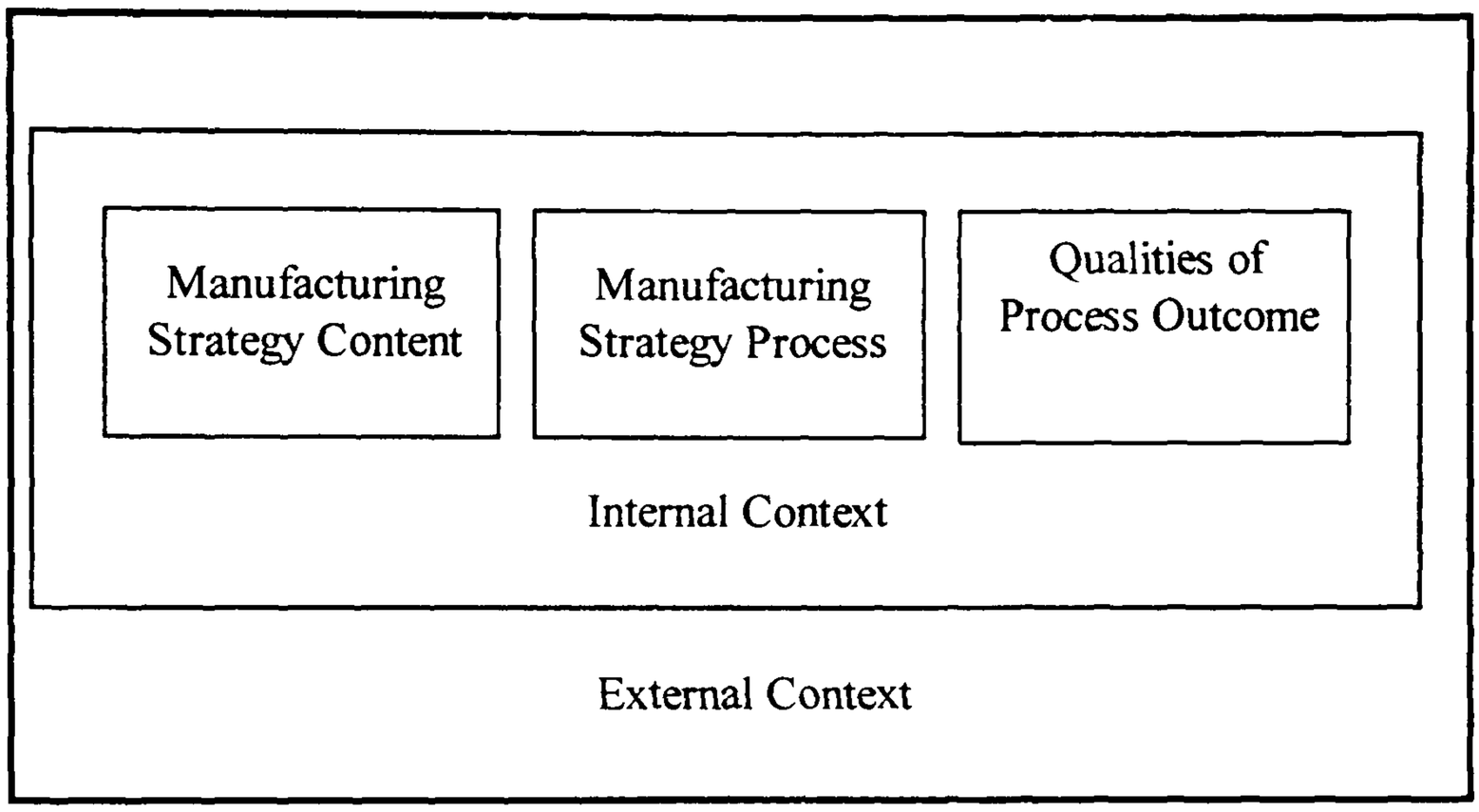

Figure 8. Contingency framework of manufacturing strategy process
Source: Adapted from Mills *et al.* (1995, p.19)

2.5.10 Strategy configuration process model

Pun *et al.* (2000a,b) introduce a strategy configuration process model developed for strategy formulation. The model consists of seven core elements (see Figure 9). The configuration process starts with the identification of strategic prerequisites (e.g., corporate vision and mission) to examine both competitive priorities (e.g. cost, quality, flexibility and delivery) and strategic decision areas (e.g. business process redesign and improvement).

The results could help determine the strategic directions and decide on the strategy choices and options; together as a system it must address the strategic alignment and transformation against competitors and 'best-in-class' performance.

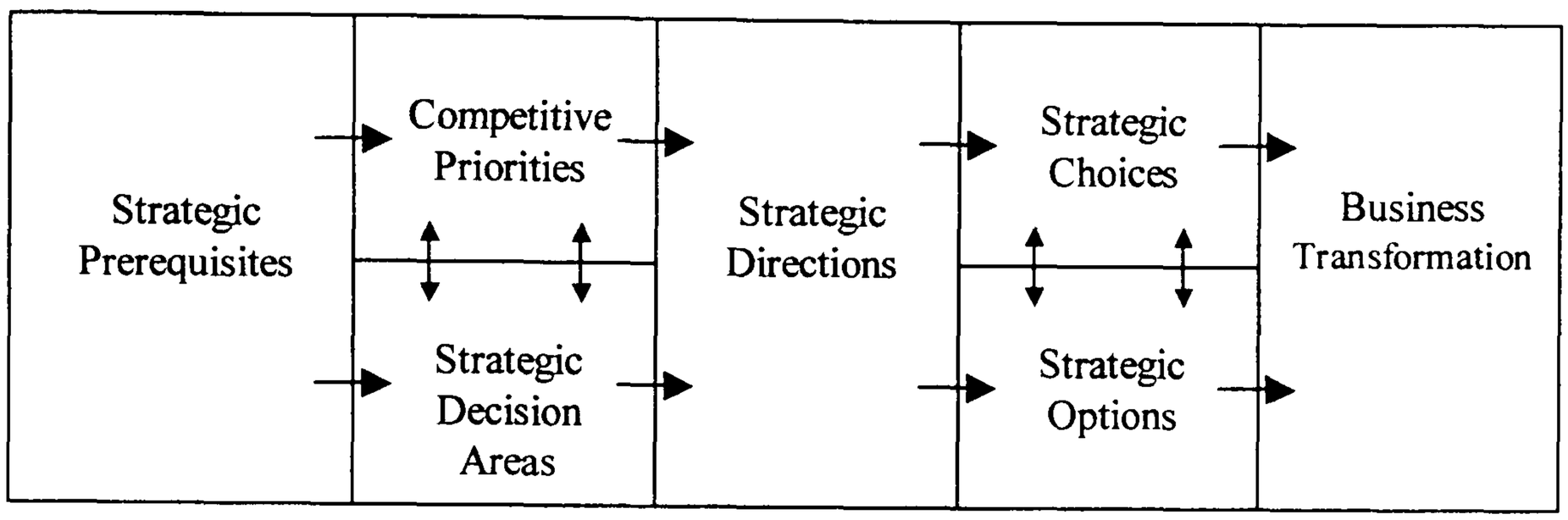

Figure 9. Strategy configuration process model
Source: Based on Pun *et al.* (2000a, p.320)

2.6 Synergy of Strategy Formulation and Configuration Process

2.6.1 Rationale of a synergy approach

Research into strategy development has come a long way. While most earlier research work into strategy formulation and implementation was directed at identifying reasons for superior performance, the focus later shifted towards the study of strategic processes and the search for sources of competitive advantage (Feurer and Chaharbaghi, 1995a). Organisations have to adjust their characteristics to the requirements of the environment by changing their strategies and strategic capabilities. Mintzberg (1994a)

argues that organisations achieve superior results if they can select from a wide range of strategic capabilities rather than concentrating on a single capability or process. The increasing complexity of business issues also requires the close co-operation of people from different areas and functions within the organisation in order to optimise the use of the knowledge base that is available in addressing the issues and enhance the level of creativity in the development of solutions (Feurer and Chaharbaghi, 1995a; Stacey, 1993). This change in the understanding of strategy formulation and implementation is reflected in the increasing amount of research that is directed towards organisation learning (Senge, 1990; Garvin, 1993), knowledge management (Davenport and Prusak, 1997), and the importance given to the redesign of business processes in the context of strategic change (Hammer and Champy, 1993).

Moreover, there has been an increasing awareness for a more integrated approach to strategy formulation and implementation. Recent work has been directed at integrating the existing models and frameworks into a more coherent and holistic approach (Hart, 1992; Mintzberg, 1994a; Pun, 2003). However, research up to date provides little guidance on how such an approach may be realised (Feurer and Chaharbaghi, 1995a). Many planning methodologies and models stand by themselves on their application domains. For instance, some methodologies stress strategic positioning (e.g. McFarlan and McKenney's strategic grid and Earl's expectancy model), others focus on identifying strategic opportunities (e.g. Porter's competitive forces, Benjamin *et al.*'s strategic opportunities framework, Porter and Miller's competitive advantages framework, etc). Besides, Venkatraman's IT-induced reconfiguration model address the issues of strategic IT/business transformation; Henderson and Venkatraman's strategic alignment model identifies the key components for strategic

business alignment; Mills *et al.*'s contingency framework analyses the strategic roles and factors of strategy process, and Pun *et al.*'s strategy configuration model identifies seven core strategic elements in the strategy formulation process. However, most of existing planning methodologies and models are prescriptive and generic in nature and have constraints borne with their own application domains. Using different planning methodologies and models may frequently lead to different strategy results and decisions (Burn and Martinson, 1997). There is no universal agreement that they are useful today, nor is there agreement that they have ever been useful. Nevertheless, many existing planning methodologies and models have distinct features with each contributing important ingredients and attributes for holistic, maximally useful strategy formulation.

2.6.2 Features and characteristics of a synergy model

In order to integrate them into a coherent strategy system, the author developed a synergy approach for manufacturing strategy formulation based on Pun *et al.*'s (2000a, b) strategy configuration process framework that aligns the capabilities of information systems with corporate strategy formulation. A diagrammatic representation of the synergy model is given in figure 10. The model comprises ten building blocks including the competitive forces framework, competitive strategy framework, strategic opportunities framework, competitive advantages framework, strategic option generator, impact model, strategic alignment model, IT-induced reconfiguration model, contingency framework, and strategy configuration process model. The synergy of these building blocks provides the theoretical groundwork for assisting manufacturers to configure strategies with respect to various strategic prerequisites and the

considerations of competitive priorities, strategic choices and options, and business transformation.

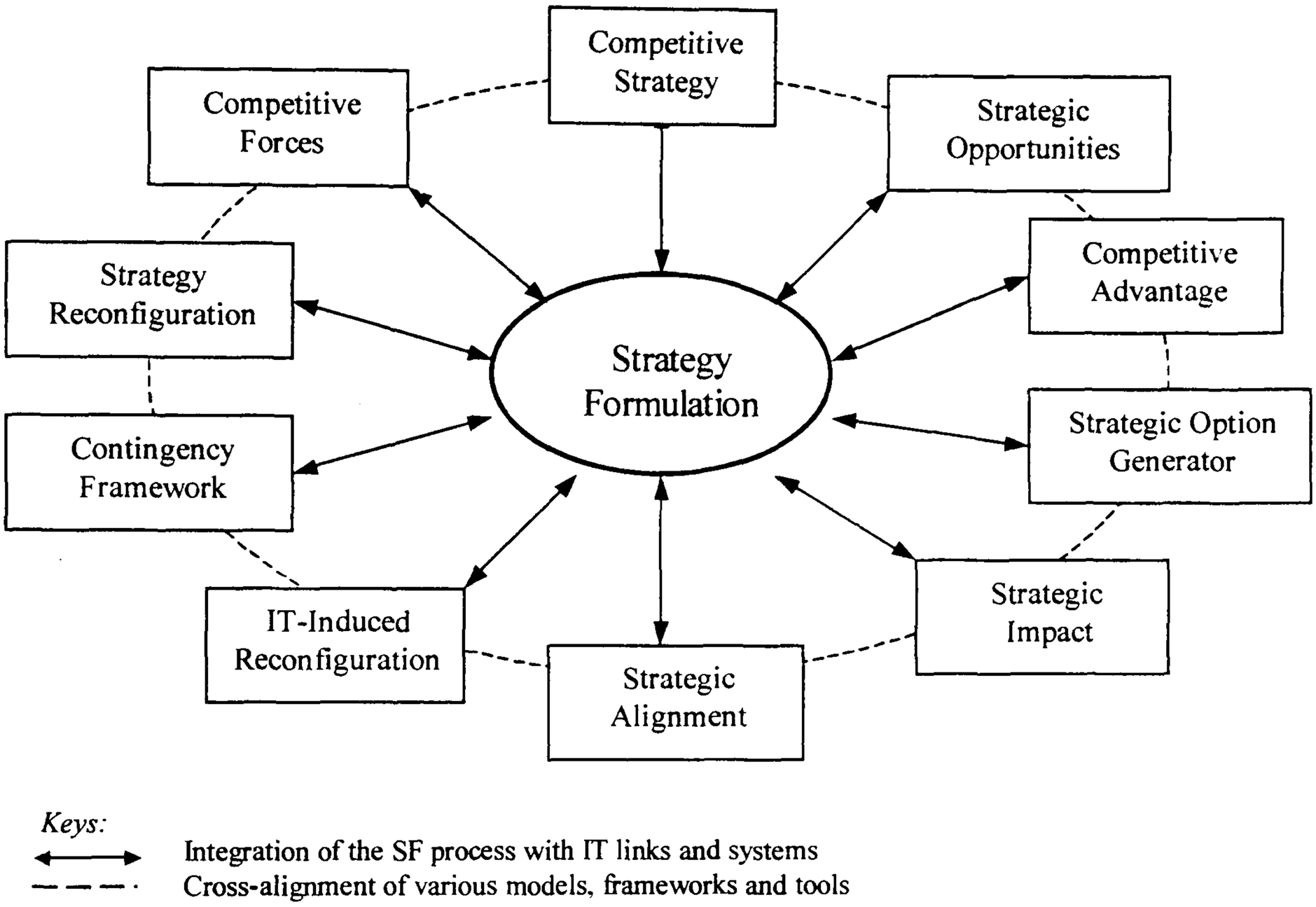

Figure 10. A synergy model for manufacturing strategy formulation

The synergy model addresses strategy contents, processes and contexts interlocking the strategic planning functions with information technology links. Figure 11 summarises the main process components of the synergy model. The fact that many interactions are at work can lead to a complex picture and two steps have been taken to simplify the model while retaining its vital components. First, it is presumed that the main impact of sectoral, national and market factors enters the strategy process from business strategy and objectives. Second, no attempt has been made to create a picture where every aspect of the

model can be seen to interact with every other, albeit in particular circumstances. This was too ambitious a picture to create given the number of interactions (Mills *et al.*, 1995).

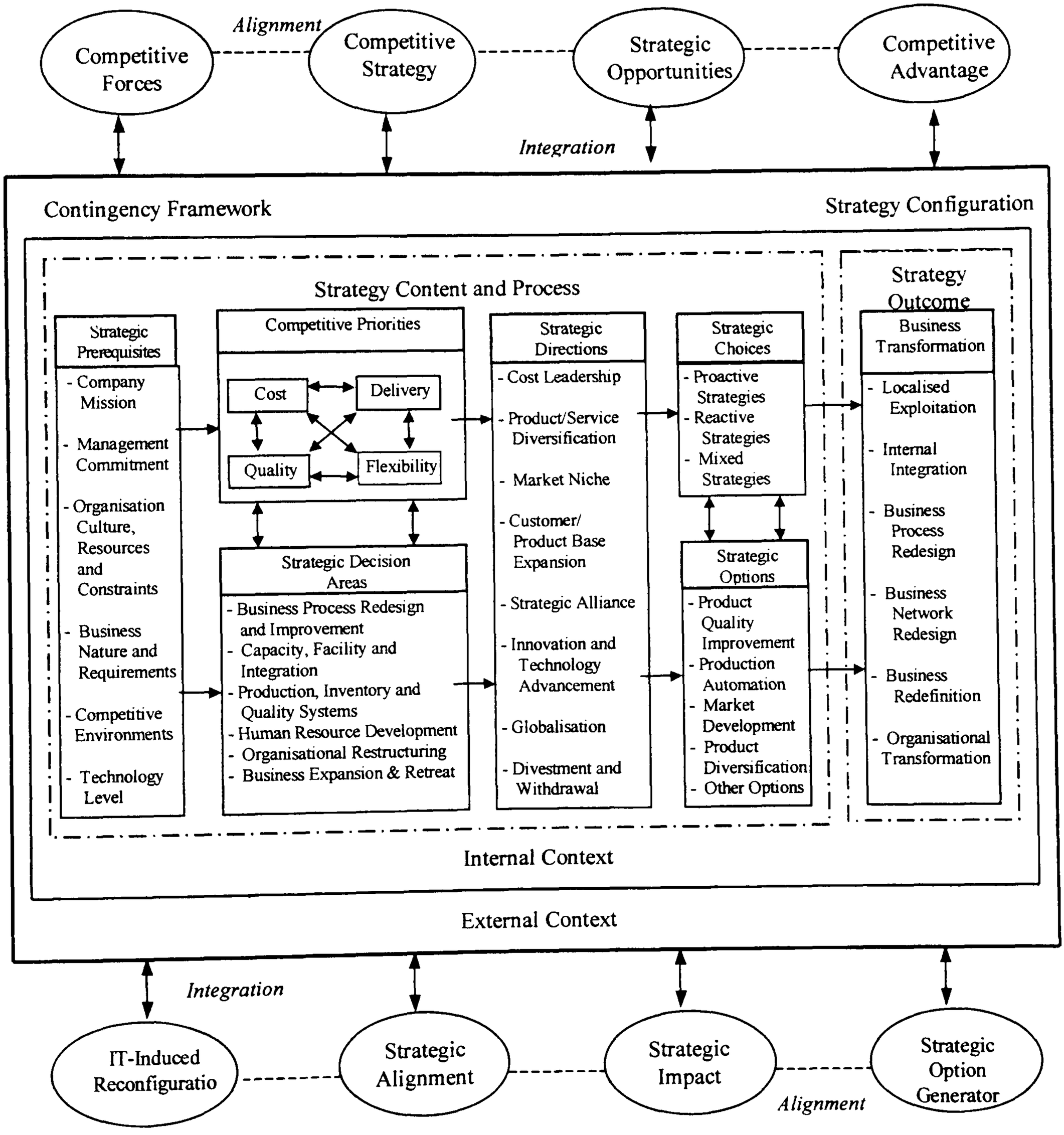

Figure 11. The manufacturing strategy formulation and configuration process
Source: Based on Pun *et al.* (2000b, p.739)

Built upon the skeleton of the strategy configuration model, the synergy model applies the competitive forces model to provide a basis for examining an organisation's current and future position. Strategic prerequisites (e.g. company mission, organisational resources and technology level) competitive priorities (e.g. cost, quality delivery and flexibility) are examined using the strategic opportunities framework. Both the competitive advantages framework and the strategic alignment model are used to examine the strategic decision areas that potentially may produce competitive advantage, emphasising the determination of strategic directions (e.g. cost leadership, product or service differentiation, market niche, and strategic alliance). Moreover, the strategic grid and the strategic option generator are employed to reaffirm the firm's position, while the impact model is used to evaluate the strategic choices and options. The synergy model makes use of the IT-induced reconfiguration to embrace the conceptualisation for the technology-strategy connection. Besides, it adopts the principles of the contingency framework to achieve a set of desired process outcomes. Table 8 summarises the audit, formulation and execution stages of the manufacturing strategy formulation and configuration process. These stages are discussed below.

- *The strategy audit stage* - According to Mills *at al.* (1995), this stage is the most documented stage in the strategy process and generally concentrates on defining the manufacturing task and assessing the ability of current strategy to achieve that task. To achieve consistency with business and other functional strategies and credibility of strategy choices, it is essential to have the involvement of the CEO and senior representatives from all functions. For instance, credibility within manufacturing and widely within other functions can be assisted by creating an awareness of the process across the firm and especially within manufacturing at an early stage. The

procedure includes 1) education on the strategy principles being used in the process, and 2) the means of gathering and comparing audit data. Comprehensiveness of the strategy is not a major issue but any deficiencies will be identified in this stage. It is necessary for this stage to enable organisations to construct the strategy that displays consistency over time (Stack, 1991; Mills *et al.*, 1995).

Table 8. The manufacturing strategy audit, formulation and execution

Process Outcome	Strategy Audit Stage	Formulation Stage	Execution Stage
Consistency with businesses and functional strategies	*Participation:* involvement of CEO and function heads and wide awareness within the business that the process is active	*Procedure:* the possibility of iterations with business and functional strategies *Participation:* regular feedback on progress to CEO and function heads	*Participation:* regular feedback on progress to CEO and function heads
Credibility within the business	*Procedure:* methods for deriving the manufacturing tasks from the business strategy	*Participation:* appropriate involvement of other functions	*Participation*: wide and deep dissemination of the strategy
Credibility within manufacturing	*Participation:* awareness of the strategy process at an early stage	*Participation:* deep involvement in the creation and checking of strategic options	*Procedure:* means of achieving widespread understanding of the strategy
Comprehensiveness	*Point of entry:* wide education of the strategy principles being used	*Procedure:* tests for comprehensiveness	
Consistency over time	*Procedure:* method of capturing past strategies	*Procedure:* methods for recognising the scale and longevity of options	
Consistency between parts of the strategy		*Procedure:* methods of predicting the effect of options in terms of interactions between decision areas	

Sources: Based on Mills *et al.* (1995, p.42)

- *The strategy formulation stage* - The aim of this stage is to generate an action plan and accompanying procedures. The plan will assist the consistency and credibility of strategy choices, and these procedures will enable iterations with business and other

functional strategies by the involvement of chief executive officer (CEO) and functional managers. Mills *et al.* (1995) argue that the achievement of consistency requires methods of predicting interactions between options in different decision areas over time. For instance, credibility within manufacturing will be improved by wide involvement in the creation and evaluation of strategy alternatives. The quality of strategy proposals and the ease of subsequent implementation will also be improved by such participation.

- *The strategy execution stage* - In this stage, consistency of the strategy choices and its credibility are still assisted by regular feedback of progress and dissemination of the content of new strategy (Mills *et al.*, 1995). Execution and deployment of new strategies often requires assistance from different functions and individuals who have not been directly involved in the strategy process.

2.6.3 Implications for manufacturing enterprises

Using the synergy model helps identify opportunities and barriers for manufacturing enterprises throughout the strategy formulation and configuration process. There will have four implications, as elaborated below:

1) The CEO and function heads must take the initiative to develop short- and long-term company goals and objectives incorporating the competitive priorities and success factors (e.g. product or service quality, customer services and market accessibility). After identification of the internal growth opportunities and external linkages, management must provide adequate resources and budgets to match

goals, and motivate people involvement to meet the corporate, business and functional needs (Pun *et al.*, 2000b). The organisational capabilities (in terms of corporate, marketing, technology, and operation strengths) and business requirements on productivity and profitability must be aligned with the chosen strategic direction (e.g. product differentiation, market niche, and market leadership).

2) In order to avoid falling into the trap of developing separate and distinct strategies and procedures, detailed implementation must be planned and key performance measures must be defined. The strategic options (e.g. proactive, reactive, or mixed strategies) must meet constraints of time, budgets and resources and other legal, ethical and environmental concerns. They must also support the business transformation and bring benefits from localised exploitation, via internal integration, to process and network redesign, and to business redefinition and organisation transformation (Henderson and Venkatraman, 1992; Pun *et al.*, 2000b).

3) The quality of a formulated strategy depends on the quality of knowledge used (Feurer and Chaharbaghi, 1995c). This in turn hinges on how effectively the process of knowledge acquisition is managed within the organisation. Strategy formulation and implementation must therefore be regarded as a constant learning process and the quality of strategy directly depends on the quality of the organisation's cognitive and behavioural learning mechanisms. The synergy model helps establish the parameters for strategy formulation and performance measures, and allows management to quantify and measure progress. Besides, it helps define realistic goals based on detailed analysis of the markets, competition, technology and other

significant factors. The CEO, function heads and middle management must identify from this where misfits occur. PM systems can provide the necessary feedback loop within the organisational learning process provided that design encompasses all stages of the strategy formulation and implementation process and the organisation's value system (Feurer and Chaharbaghi, 1995b,c).

4) Strategy must be treated as part of individual responsibilities throughout the organisation as opposed to a central function. By transferring the ownership of strategy in this way the quality of knowledge used for strategy formulation will be substantially improved, while potential conflicts and the timeframe for strategy implementation will be dramatically reduced (Feurer and Chaharbaghi, 1995a; Mill *et al.*, 1995).

Different organisations might have tried to implement various planned changes and improvement aligned with their strategies. Some have achieved stunning results while others have been disappointed. Lack of a systematic, structured approach for integrating strategy formulation and execution is often the primary cause of the process deficiencies. Individual departments are pursuing their own goals and fail to integrate them with overall organisational goals. Therefore, it must encourage inter-departmental cooperation and empower managers and employees by providing them with authority to carry out planned activities (DeFeo and Janssen, 2001a, b; Mills *et al.*, 1995). In many cases, clear responsibilities are limited to local or intradepartmental processes, and improvement goals are assumed to apply only to manufactured goods and manufactured processes. There is often no clear responsibility for reducing cycle times or waste associated with major businesses processes (DeFeo and Janssen, 2001b). Each of these deficiencies can be

corrected in the strategy formulation process through the integration of organisation's core competencies and improvement initiatives. The synergy model advocates that all strategies and their execution must be reviewed, and the success must be communicated throughout the organisation with respect to its corporate objectives, competitive priorities, and the changing business environments.

2.7 Concluding Remarks

It is widely recognised that strategies are much more complex than plans because they evolve as decisions are made and courses of action are pursued (Neely *et al.*, 1994). Contemporary thinking about corporate strategy encompasses ideas about organisational capabilities (Stalk *et al.*, 1992), core competences (Pralahad and Hamel, 1990), organisational learning (Senge, 1990; Garvin, 1993), knowledge management (Davenport and Prusak, 1997), and the importance given to the redesign of business processes in the context of strategic change (Hammer and Champy, 1993). Recent studies (e.g. Deloitte and Touche, 1992; Noble, 1999; Porter, 1998; Pun *et al.*, 2000a) found that organisations with strategic planning and strategy formulation generally outperform those with no formalised planning systems. Forward-looking enterprises would formulate their strategies to bring good business results, organisational growth and development. However, there is no one strategy that is optimal for all companies (Kotler, 2000). The strategy formulation process appropriate for a firm with functional organisational structure can be quite different from one suitable for addressing the strategic tasks of a highly diversified corporation.

This chapter reviews the concepts associated with strategy, strategic planning and strategy formulation, and discusses the strategy determinants, the 'reactive/proactive' dimension of strategy, and the obstacles to the implementation of strategic decisions in the manufacturing context. Four groups of strategy determinants are identified, including corporate, market, technology and operational strengths. The determination and adoption of strategy choices depends variably with corporate mission, business goals and nature, competitive position, organisational resources and constraints of manufacturing enterprises. Communication, management support, and good information system are found to be the key tools for strategy implementation processes. The reviewing of the issues surrounding strategy, strategic planning and strategy formulation provide the conceptual foundation and links between strategy formulation and performance measurement and help design the subsequent empirical study of the research (see *Chapter Five*).

The chapter also discusses the characteristics of ten selected planning frameworks and methodologies pertaining to strategy formulation. These models and frameworks provide a set of diversified aids and references for organisations to formulate and deploy their strategies. For instance, McFarlan and McKenney's (1983) strategic grid and Earl's (1989) expectancy model assist organisations in understanding of the current system functions and assessing their situations in the marketplace. Porter's (1980) competitive forces model Benjamin *et al.*'s (1984) strategic opportunities framework, Porter and Millar's (1985) competitive advantages framework, etc help organisations to develop vision, reorient thinking and identify strategic possibilities for the current systems. Other recent models, like 1) IT-induced reconfiguration model (Venkatraman, 1991; Burn, 1997) establishes the architecture for various level of strategic transformation, 2) contingency framework (Mills *et*

al., 1995) analyses the strategic roles and factors of strategy process, and 3) strategy configuration model (Pun *et al.*, 2000a, b) configure the strategy formulation process with seven core strategic elements. Although most of them stand by themselves empirically and/or theoretically, they have constraints borne with their own application domains.

The review verifies a growing cognizance that no single strategy process or single planning model can guarantee any organisation to gain sustainable competitive advantage. This chapter has made an attempt to incorporate ten selected planning models and frameworks, and set forth a synergy model for manufacturing strategy formulation. The model stresses the 'process, content and context' of manufacturing strategy. It encompasses the translation of corporate mission and objectives into action plans, the allocation of resources, the assessment and selection among various strategic alternatives, and measures of the results and performance. Using the synergy model helps managers and policy makers to examine their competitive priorities, and determine the strategic decision areas and direction for their organisations. The success relies significantly on the presence of various determinants as discussed, and more importantly, the way that how the strategy formulation link to deployment and performance measurement for enhancing improvement. The ensuing chapter will review the performance measurement initiatives for sustaining performance goals in manufacturing enterprises.

Chapter 3

Managing Performance Measurement in Manufacturing Enterprises: Theory and Practice

3.1 Introduction

Measuring organisational performance plays a very important part in translating corporate strategy into results (Amaratunga and Baldry, 2002; Dixon *et al.*, 1990). The need for companies to align their performance measurement (PM) systems with their strategic goals is well documented in the literature (Gregory, 1993; Hudson *et al.*, 2001). Performance measurement systems historically were developed as a means of monitoring and maintaining organisational control, which is the process of ensuring that an organisation pursues strategies that lead to the achievement of overall goals and objectives. The way an organisation measures performance reflects it's corporate culture, and strategy formulation and deployment. Traditionally, manufacturing enterprises rely largely on financial measures and process outcomes using self-referenced objective data from internal sources (White, 1996; Kennerley and Neely, 2003). The shortcomings of traditional systems have triggered a performance measurement revolution (Neely, 1999) and various novel frameworks have been devised to aid manufacturing enterprises to select and implement measures since the 1980s (Hudson *et al.*, 2001; Medori and Steeple, 2000). Meanwhile, many organisations are now adopting the total quality management (TQM) and business excellence philosophies to foster continuous performance improvements (Dale, 1999; Najmi and Kehoe, 2001). This chapter reviews the theory and practice of PM and

contrasts the characteristics of emerging PM systems. It discusses the TQM-business excellence philosophies and practices with performance measures, and explain a holistic link between PM and strategy development and deployment along with the identification of performance attributes and deployment of processes and strategies in manufacturing enterprises.

3.2 Performance Measurement and Measures

3.2.1 Ascertaining the needs for performance measures

Recent research (Carrie and MacIntosh, 1992; De Toni and Tonchia, 1996; Ghalayini and Noble, 1996; Kennerley and Neely, 2002) has identified the need for effective deployment of business objectives down through the organisation and the subsequent measurement of performance in critical areas as key elements of sustainable competitive advantage. This is due significantly to the broadening spectrum of performances required by the dynamic competitive environment. Manufacturing enterprises are experiencing a high degree of pressure on their industry. Several external trends justify the strong focus on competitive issues, including globalisation, customer orientation, process orientation and high productivity (Rolstadas, 1998). They have to deploy strategies and obtain feedback from various levels to manage their performance.

Mintzberg (1994a) argues that strategies are realised through consistency of decision-making and action. Zairi (1994) identifies that performance measurement has been

the systematic assignment of a number of activities; and suggests that the function of measurement is to develop a method for generating a class of information that will be useful in a wide variety of problems and situations. Neely *et al.* (1995) argue that performance measurement is a process of quantifying the efficiency and effectiveness of action that leads to performance. According to Sinclair and Zairi (1995a), performance measurement is concerned with determining how successful organisations have been in attaining their objectives, whereas performance measures are the numerical or quantitative indicators that show how well each objective is being met. Buxton and Ward (1998) add that performance measurement is composed of various performance measures which are linked to performance management through the setting of goals, standards and targets for improving an enterprise's performance. Organisations may measure their performance systematically and thoroughly, or on an *ad hoc* basis. This attracts much cynicism and scepticism over why, how and when performance measures is used (Parker, 2000). Quantitative measures (e.g. financial ratios, staff turnover, and number of customers' complaints) are easy to measure and manage. On the other hand, qualitative measures (e.g. quality, customer satisfaction, innovation, motivation, morale, leadership and customers' perception) are difficult to measure, and are often at different levels of aggregation and linked loosely, if at all, to the current strategies of the business (Bourne *et al.*, 2002; Platts *et al.*, 1998).

Traditional performance measures have been primarily based on management accounting systems. This has resulted in most measures focusing on return on investment, return on sales, price variances, sales per employee, productivity and profit per unit production. Many recent studies indicated that these financial data have the advantage of

being precise and objective, but they do not match entirely with the competencies and skills required by companies for today's changing business environment (Geanuracos and Meiklejohn, 1993; Ghobadian and Ashworth, 1994; Johnson and Kaplan, 1987; Medori *et al.*, 1995; Najmi and Kehoe, 2001). Moreover, it is not enough only to know the amount of gross profit or loss, but it is necessary to explain the driving forces behind success or failure (Kennerley and Neely, 2002). Rather than to analyse these reasons from a historical perspective, it needs to understand organisational excellence, which potentially leads to the success of a business in the future (Kanji, 2001). Accounting figures alone do not emphasise the elements that will lead to good or poor future financial results. Many other indicators of business performance (such as quality, customer satisfaction, innovation and market share) that can always reflect an organisation's economic condition and growth prospects better than its reported earnings do (Eccles and Pyburn, 1992). Therefore, performance measures must go beyond the presentation of financial figures, and serve as the driver for fostering performance.

3.2.2 Criteria, dimensions and characteristics of performance measures

Eccles (1991) argues that "what gets measured gets attention, particularly when rewards are tied to the measures". In order to attain the measurement goals, White (1996) suggested that several basic questions must be answered, including 1) What will be measured; 2) How will it be measured? 3) Where will the data be obtained? 4) What type of data will be used? 5) How the data will be used in evaluating performance? and 6) Where and when does the measurement occur? Ray and Sahu (1990) argue that organisational

performance is a multi-dimensional entity and should be linked to the desired outcomes. Rolstadas (1998) claim that an organisation's performance would show a complex interrelationship among seven measurement criteria (see figure 12). These are:

- Effectiveness involves doing the right things, at the right time, with the right quality. Defining the criteria as a ratio, effectiveness can be defined as actual output or expected output.
- Efficiency is an input- and transformation process-question, defined as resource expected to be consumed/resources actually consumed.
- Productivity is the traditional ratio of output/input.
- Profitability represents the ultimate goal for an organisation.
- Quality is an extremely wide concept, and could be measured at various checkpoints.
- Quality of work life is an essential contribution to a well-performing system.
- Innovation is a key element in sustaining and improving performance.

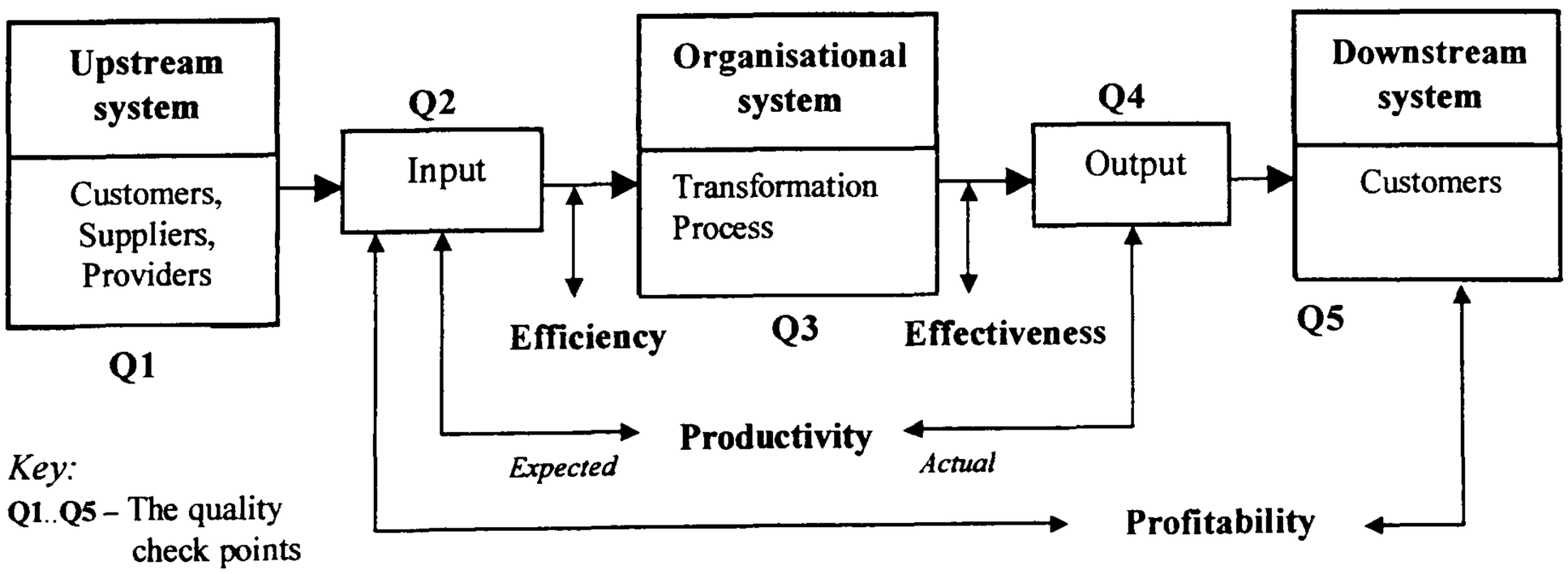

Figure 12. Operational definition of performance criteria
Source: Based on Rolstadas (1998, p.991-992)

According to Crawford and Cox (1990), performance criteria are the relative elements used to evaluate performance. The actual values of performance criteria over some specified time period are the performance measures, and performance standards are the accepted levels of performance for each criterion. Hudson *et al.* (2001) argue that the dimensions of performance for which measures have caused a degree of replication in the literature. For instance, Moseng and Bredrup (1993) look at performance as the integration of three dimensions of efficiency, effectiveness and adaptability. The first two dimensions are the same as those advocated by Sink and Tuttle (1989). The third expresses to which extent the company is prepared for future changes. Moreover, time, quality and flexibility are commonly cited as the main operational dimensions that should be measured (Leong *et al.*, 1990; Lynch and Cross, 1991; Neely *et al.*, 1995; Collier, 1995; White, 1996; Medori and Steeple, 2000). Finance, in various different forms, is also considered to be a critical dimension of performance (Sink and Tuttle, 1989; Jones *et al.*, 1993; Meyer, 1994; Ghalayini *et al.*, 1997). In addition, customer satisfaction and human resources are repeatedly cited as critical measurement areas (Eccles, 1991; Kaplan and Norton, 1992; Fitzgerald and Moon, 1996).

Table 9 illustrates the grouping of the terms found in the literature into six general dimensions. Hudson *et al.* (2001) argue that these dimensions can be seen to cover various aspects of business, such as the financial results, the operating performance (through the dimensions of time, quality and flexibility), the way the company is perceived externally (through its customers), and the cultural aspects of the working environment (through the human resource dimension).

Table 9. Critical dimensions of performance

Quality	Time	Flexibility	Finance	Customer satisfaction	Human resources
-Product performance -Delivery -Reliability -Waste -Dependability -Innovation	-Lead time -Delivery reliability -Process throughput time -Process time -Productivity -Cycle time -Delivery speed -Labour efficiency -Resource utilisation	-Manufacturing effectiveness -Resource utilisation -Volume flexibility -New product introduction -Computer systems -Future growth -Product innovation	-Cash flow -Market share -Overhead cost reduction -Inventory performance -Cost control -Sales -Profitability -Efficiency -Product cost reduction	-Market share -Service -Image -Integration with customers -Competitiveness -Innovation -Delivery reliability	-Employee relationships -Employee involvement -Workforce -Employee skills -Learning -Labour efficiency -Life -Resource utilisation -Productivity

Source: Abstracted from Hudson *et al.* (2001, p.1102)

Moreover, White (1996) proposed a taxonomy that classifies performance measures with respect to the competitive capability being measured (i.e. cost, quality, flexibility, delivery reliability and speed), data source (i.e. internal and external), data type (i.e. objective and subjective), reference (i.e. benchmark and self-referenced), and process orientation (i.e. input and outcome). It is, however, important to note that these dimensions and the taxonomy are not prescriptive. Instead, they are intended to encourage the holistic consideration of these areas when developing measures to support the company strategy. White (1996) argued that many performance measures have focused largely on process outcomes using self-referenced objective data from internal sources. Companies might need more subjective type measures from external data sources and/or focus on the use of more benchmark measures instead of only self-referenced ones. Researchers and practitioners should seek out more objective measures and more data from external

sources, and consider looking at more process input measures (Ghalayini and Noble, 1996; Neely *et al.*, 1997; White, 1996).

Globerson (1985) and Maskell (1989) presented sets of guidelines detailing the characteristics of performance measures, which have often been reiterated in more recent literature (Dixon *et al.*, 1990; Lynch and Cross, 1991; Beischel and Smith, 1991; Kaplan and Norton, 1992, 1996; Lea and Parker, 1989; Neely *et al.*, 1996). For instance, Lynch and Cross (1991) stressed the link between strategies, action and measures. Lea and Parker (1989) suggested that measures of performance should 1) be transparent; 2) simple to understand; 3) have visual impact; 4) focus on improvement rather than variance; and 5) be visible to all. Neely *et al.* (1997) reviewed this literature and encapsulated a set of characteristics of performance measure below:

- Be derived from strategy;
- Provide timely and accurate feedback;
- Relate to specific, stretching, but achievable goals (targets);
- Be based on quantities that can be influenced, or controlled, by the user alone or the user in cooperation with others;
- Be clearly defined;
- Be part of a closed management loop;
- Have an explicit purpose;
- Be based on an explicitly defined formula and source of data;
- Employ ratios rather than absolute numbers;
- Use data which are automatically collected as part of a process whenever possible;
- Provide fast feedback;

- Provide information;
- Be precise and be exact about what is being measured; and
- Be objective and not based on opinion.

Further, Hudson *et al.* (2001) argued that many of these characteristics are duplicated or are deemed to be desirable. The removal of duplication and a focus on critical characteristics resulted in the following set as depicted in table 10.

Table 10. Critical characteristics of performance measures

Characteristics	Reference
Derived from strategy	Globerson, 1985; Maskell, 1989; Dixon *et al.*, 1990, Beischel and Smith, 1991; Lynch and Cross, 1991; Kaplan and Norton, 1992, 1996; Neely *et al.*, 1996
Clearly defined with an explicit purpose	Globerson, 1985, Lea and Parker, 1989; Neely *et al.*, 1996
Relevant and easy to maintain	Maskell, 1989; Beischel and Smith, 1991; Lynch and Cross, 1991; Kaplan and Norton, 1992, 1996
Simple to understand and use	Maskell, 1989; Lynch and Cross, 1991; Neely *et al.*, 1996
Provide fast and accurate feedback	Globerson, 1985, Dixon *et al.*, 1990; Maskell, 1989; Neely *et al.*, 1996
Link operations to strategic goals	Lynch and Cross, 1991; Kaplan and Norton, 1992, 1996
Stimulate continuous improvement	Maskell, 1989, Lea and Parker, 1989; Lynch and Cross, 1991; Kaplan and Norton, 1992, 1996; Neely *et al.*, 1996

Source: Based on Hudson *et al.* (2001, p.1101)

3.3 Performance Measurement Systems

3.3.1 Evolution of performance measurement systems

Most traditional performance measurement systems originated from the techniques of management accounting and were developed over a period from the late nineteenth century (Eccles, 1991; Kaplan and Norton, 1993). These techniques (e.g. financial ratios and budgetary control procedures developed in DuPont and General Motors) were widely adopted and hardly evolved during the subsequent eighty years (Neely and Bourne, 2000). They became the accepted method of measuring the performance of a manufacturing plant or distribution operation. Although there have been dramatic changes in manufacturing techniques and technology since the 1970s, management accounting has stayed broadly the same (Maskell, 1992). Neely and Bourne (2000) also argue that times had changed, but performance measurement had not kept up.

In the early 1980s, there was a growing realisation that given the increased complexity of organisations and the markets in which they compete, it was no longer appropriate to use financial measures as the sole criteria for assessing success (Ghalayini and Noble, 1996). Traditional performance measurement systems have been criticised as being too narrowly focused on financial figures and functional level performance such that they often fail to capture organisational long-term business success (Dixon *et al.*, 1990; Kaplan and Norton, 1992, 1993; Maskell, 1992; Sim and Koh, 2001). In the late 1980s, there was a surge of interest in new measures, but the vast majority of people discussing their organisation's measurement systems spoke about isolated initiatives. They talked

about introducing measures of shareholder value, economic profit, customer satisfaction, employee satisfaction, internal operations performance, intellectual capital and intangible assets. At that time each of these individual measures of performance was designed to supplement the pre-existing financial measures (Neely and Bourne, 2000). Due to the broadening of the spectrum of performance required and to the support of programmes for performance improvement (e.g. Concurrent Engineering, Just-in-Time, and Total Quality Management), the growing interest in the performance measurement systems has led to an updating of the accounting systems and also an extension to the non-cost performance (De Toni and Tonchia, 2001; Ghalayini and Noble, 1996).

In the early to mid-1990s, many researchers and practitioners became interested in developing integrated, rather than piecemeal, measurement systems (Neely and Bourne (2000). More research attention was paid to measurement frameworks, such as the balanced scorecard (Kaplan and Norton, 1992, 1996). There is immense value in the act of deciding what to measure. The major reason for this is that the process of deciding what to measure forces the management team to be very explicit about the language they are using. The management has to explain what they mean by satisfied customers, because if they do not then there is no way they can decide how to measure whether or not their customers are satisfied. Hence, the act of deciding what to measure forces the management team to clarify their language and define precisely what their strategy encompasses (Neely and Bourne, 2000). The next major theme to emerge was the notion that measures, once precisely defined, offered an excellent way of achieving goal congruence or organisational alignment.

In the late 1990s and early 2000s, many commentators in the field started to talk about the importance of measurement as a means of communication and encouraging implementation of strategy (Neely and Bourne, 2000). Table 11 summarises those from a vast amount of literature on performance measurement systems (De Toni and Tonchia. 2001; Ghalayini and Noble, 1996; Neely *et al.*, 1995), which can be considered to be the main changes and trends in development that have been affected by or now concern these systems.

Table 11. Evolution of performance measurement systems

Traditional PM Systems	Emerging PM Systems
• Based on traditional accounting system	• Based on company strategy
• Based on cost/efficiency	• Value-based
• Trade-off between performance	• Performance compatibility
• Profit-oriented	• Customer-oriented
• Short-term orientation	• Long-term orientation
• Prevalence of individual measures	• Prevalence of team measures
• Prevalence of functional measures	• Prevalence of transversal measures
• Comparison with standard	• Improvement monitoring
• Aims at evaluating	• Aims at evaluating and involving
• Hinders continuous improvement	• Stresses continuous improvement

Sources: Based on De Toni and Tonchia (2001, p.47); Ghalayini and Noble (1996, p.68)

In order for organisations to ensure achievement of their goals and objectives, Ghalayini and Noble (1996) argue that performance measures are used to evaluate, control and improve the production processes. They are used to compare the performance of different organisations, plants, departments, teams and individuals. The complexity of managing an organisation today requires that managers be able to measure performance

and to analyse the impacts of different performance dimensions on organisational excellence.

3.3.2 Design of performance measurement systems

The problem of how organisations should assess their performance has been challenging management commentators and practitioners for many years. The shortcomings of traditional measurement systems have triggered a performance measurement revolution (Eccles, 1991; Neely, 1999; Neely and Bourne, 2000). Attention in practitioner, consultancy and academic communities has turned to how organisations can replace their existing, traditionally cost-based, measurement systems with ones that reflect their current objectives and environment. Performance measurement systems need to be designed, managed and evaluated periodically to ensure that it yields the desired business results (Gregory, 1993; Waggoner *et al.*, 1999). Neely *et al.* (1995) define a performance measurement system as "the set of metrics used to quantify both the efficiency and effectiveness of actions". Bititci *et al.* (1997) argue that the PM system enables a closed-loop deployment of organisational strategies, and which provides a structured framework to allow the relevant information to feed back to the appropriate points to facilitate the decision and control processes. Many authors have focused attention on how organisations can design more appropriate measurement systems. For instance, Neely *et al.* (1995) propose a framework for performance measurement system design, whereas Waggoner *et al.* (1999) argue that performance measures within an organisation can be designed on the

basis of six disciplinary approaches, including management accounting, engineering, statistical, objective setting, conformance to specification, and consumer marketing.

According to Neely *et al.* (1996), the reasons for implementing performance measurement systems usually fall into five general categories: monitoring of performance, identification of areas that are need of attention, enhancing motivation, improving communications, and strengthening accountability. Lockamy (1998) adds that a performance measurement system must provide a means for 1) maintaining an alignment between strategic objectives and market requirements; 2) coordinating the effective use of company resources; and 3) monitoring progress toward the achievement of pre-determined strategic objectives. The system is required for each of these objectives to serve as a mechanism for monitoring progress.

Bititci *et al.* (2000) suggests a set of specifications for a dynamic performance measurement system. These specifications include:

- an *external control system* which uses performance measures to continuously monitor the critical parameters in the external environment for changes;
- an *internal control system* which uses performance measures to continuously monitor the critical parameters in the internal environment for changes;
- a *review mechanism* which uses the performance information provided by the internal and external monitors and the objectives and priorities set by higher level systems to decide internal objectives and priorities;
- a *deployment system* which deploys the revised objectives and priorities to business units, processes and activities using performance measures;

- a system which facilitates the management of the *causal relationships* between various performance measures;
- a system which facilitates *quantification* of the causal relationships to quantify *criticality* and priorities;
- a system which ensures that *gains* made as a result of improvement initiatives are *maintained* through local performance measures used by the people who work within activities and processes; and
- a system which facilitates identification and use of performance limits and thresholds to generate *alarm signals* to provide early warning of potential performance problems.
- an *IT platform* which provides an executive information system as a mean of maintaining the performance measurement system.

In order to develop a strategic PM system, it is critically important to identify the properties of an effective development process. Hudson *et al.* (2001) identify nine requirements for an effective PM development process. A list of these requirements for PM systems development is depicted along with Bititci *et al.*'s (2000) specifications in table 12. By applying a four-component process framework (i.e. point of entry, participation, procedure, and project management) advocated by Platts (1994), an effective point of entry for PM development would necessarily involve an evaluation or audit of the existing PM system, to highlight areas of deficiency and indicate a need for improvement. Participation in the process should include employees who will be the key users of the performance measures developed (Lynch and Cross, 1991; Neely *et al.*, 1996). Identifying the procedures for developing strategic PM systems is rather more problematic, as these will

vary between processes. However, to ensure strategic alignment, a procedure for identifying strategic objectives should be included. A method for developing the measures is also necessary, along with a procedure for maintaining the new PM system. In addition, according to Hudson *et al.* (2001), the key principles of project management for effective PM development are top management support, everybody on board, clear explicit objectives, and set timescales.

Table 12. Specifications and requirements for PM systems development

Specifications of PM Systems[1]	**Requirements for PM Development**[2]
1) External control system	1) Need evaluation/existing PM audit
2) Review mechanism	2) Key user involvement
3) Deployment system	3) Strategic objective identification
4) Causal relationships	4) Performance measure development
5) Quantify criticality	5) Periodic maintenance structure
6) Internal control system	6) Top management support
7) Gains maintenance	7) Full employee support
8) Alarm signal	8) Clear and explicit objectives
9) IT platform	9) Set timescales

Sources: Abstracted from [1]Bititci *et al.* (2000) and [2]Hudson *et al.* (2001)

3.3.3 Emerging performance measurement systems

Over the last two decades, measurement systems incorporating financial and non-financial measures have been a topic of considerable interest to both business practitioners and academics (Medori and Steeple, 2000). Based on the literature, consultancy experience and action research, numerous processes have been developed that organisation can follow in order to design and implement performance measurement systems (Bourne *et al.*, 2002).

Many emerging PM systems (including models, frameworks and tools) have also been devised to support the processes and aid manufacturing organisations to select and implement measures. A list of emerging PM systems is provided in table 13, and the main features and characteristics of individual systems are described as follows:

Table 13. A list of emerging systems for performance measures

Ref.	PM Systems, Frameworks and Tools	References
1.	Strategic Measurement Analysis and Reporting Technique (SMART)	Cross and Lynch, 1989; Lynch and Cross, 1991
2.	Performance Measurement Questionnaire (PMQ)	Dixon *et al.*, 1990
3.	Results and Determinants Matrix (R&DM)	Fitzgerald *et al.*, 1991; Fitzgerald and Moon, 1996
4.	The Balanced Scorecard (BSC)	Kaplan and Norton, 1992, 1996
5.	Comparative Business Scorecard (CBS)	Kanji, 1998, 2000; Kanji and Moura e Sá, 2002
6.	Cambridge Performance Measurement Process (CPMP)	Neely *et al.*, 1995, 1996; Bourne *et al.*, 1998, 2000
7.	Consistent Performance Measurement Systems (CPMS)	Flapper *et al.*, 1996
8.	Integrated Performance Measurement Systems (IPMS)	Bititci *et al.*, 1997, 1998a,b
9.	Dynamic Performance Measurement Systems (DPMS)	Bititci *et al.*, 2000
10.	Integrated Performance Measurement Framework (IPMF)	Medori, 1998a,b; Medori and Steeple, 2000

3.3.3.1 Strategic Measurement Analysis and Reporting Technique (SMART)

The SMART system was developed by Wang Laboratories, Inc. as a result of dissatisfaction with traditional performance measures such as utilisation, efficiency, productivity and other financial variances (Cross and Lynch, 1989; Lynch and Cross, 1991). The objective was to devise a management control system with performance

indicators designed to define and sustain success. A diagrammatical representation of the SMART system is depicted in figure 13.

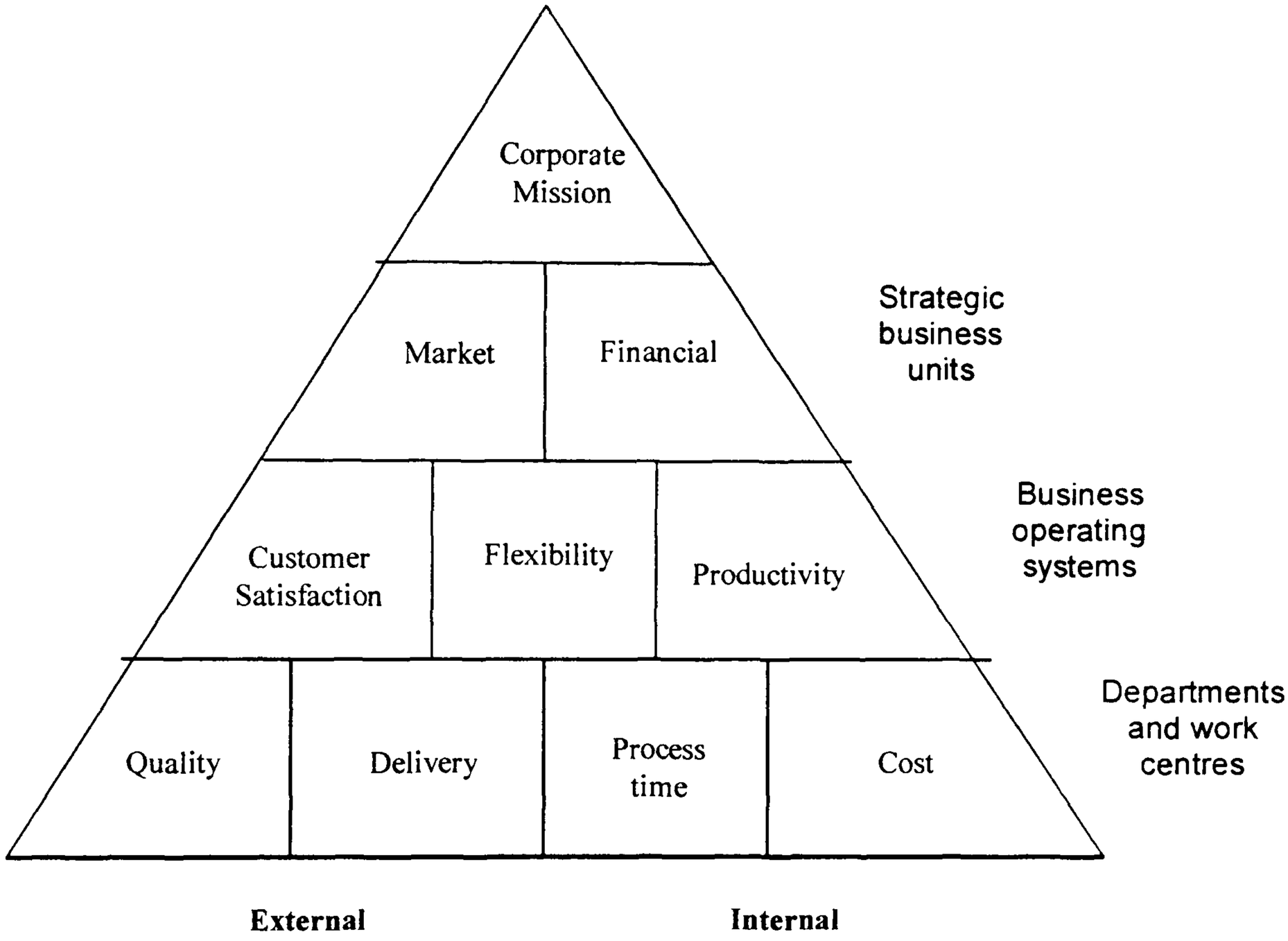

Figure 13. The SMART performance pyramid
Sources: Abstracted from Lynch and Cross (1991)

The system is made up of a four-level performance pyramid of objectives and measures. At the top is the corporate vision or strategy. At this level, management assigns a corporate portfolio role to each business unit and allocates resources to support them. At the second level, objectives for each business unit are defined in market and financial terms. At the third level, more tangible operating objectives and priorities can be defined for each

business operating system in terms of customer satisfaction, flexibility and productivity. At the fourth level, the department level, customer satisfaction, flexibility and productivity are represented by specific operational criteria: quality, delivery, process time and cost. As the foundation of the performance pyramid, these operational measures are the keys to achieve higher-level results and ensure successful implementation of the company strategy.

3.3.3.2 Performance measurement questionnaire (PMQ)

Dixon *et al.* (1990) developed an approach of performance measurement questionnaire to help managers identify the improvement needs of their organisation, to determine the extent to which the existing performance measures support improvements and to establish an agenda for performance measure improvements. The PMQ consists of four parts. The first part provides general data to be used to classify the respondents. Part two of the questionnaire assesses the companies' competitive priorities and performance measurement system. It consists of items labelled as 'improvement areas'. They are placed in the centre of the questionnaire as shown in figure 14.

Long-run importance of improvement	**Improvement areas**	**Effect of current performance measures on improvement**
None >>>> Great		Inhibit >>>> Support
1 2 3 4 5 6 7	Quality	1 2 3 4 5 6 7
1 2 3 4 5 6 7	Labour efficiency	1 2 3 4 5 6 7
1 2 3 4 5 6 7	Machine efficiency	1 2 3 4 5 6 7

Figure 14. An excerpted section of PMQ
Source: Abstracted from Dixon, *et al.* (1990, p.68)

The respondents (e.g. senior management and representatives from middle management or front-line personnel) are asked to circle a number on each side of the table. The third part of the questionnaire is similar to Part two except the focus is on performance factors (i.e. performance measures). The final part of the questionnaire asks the respondents to provide performance measures that best evaluate their own performance and any other general comments. The results of the PMQ are evaluated in four ways. These are: 1) alignment analysis is conducted to investigate in general terms how well a company's actions and measures complement its strategy; 2) congruence analysis is conducted to provide a detailed understanding of how well the measurement system supports an organisation's actions and strategy; 3) consensus analysis shows the effect of communication and is carried out by grouping the data by management level or by functional group, and 4) the goal of the confusion analysis is to determine the extent of consensus (i.e. standard deviation) regarding each improvement area and performance measure.

3.3.3.3 The Results and Determinants Matrix (R&DM)

Fitzgerald *et al.* (1991) examined performance measurement in for-profit services, and concluded that performance measures fell within two broad categories: end results, and means or determinants. The results were further subdivided into competitiveness and financial measures. The means or determinants were subdivided into four broad categories. These were: quality of service, flexibility, resource utilisation, and innovation. The core elements of a results and determinants matrix are depicted in figure 15. The relevance and

exact nature of a performance measurement system was dependent on contingency factors. Several measures (e.g. competitiveness, liquidity, capital structure, and market ratios) would not vary across the three generic service types (Fitzgerald and Moon, 1996). The development of an integrated performance measurement system belonged to the whole management team and not just to the management accountants (Ghobadian and Ashworth, 1994).

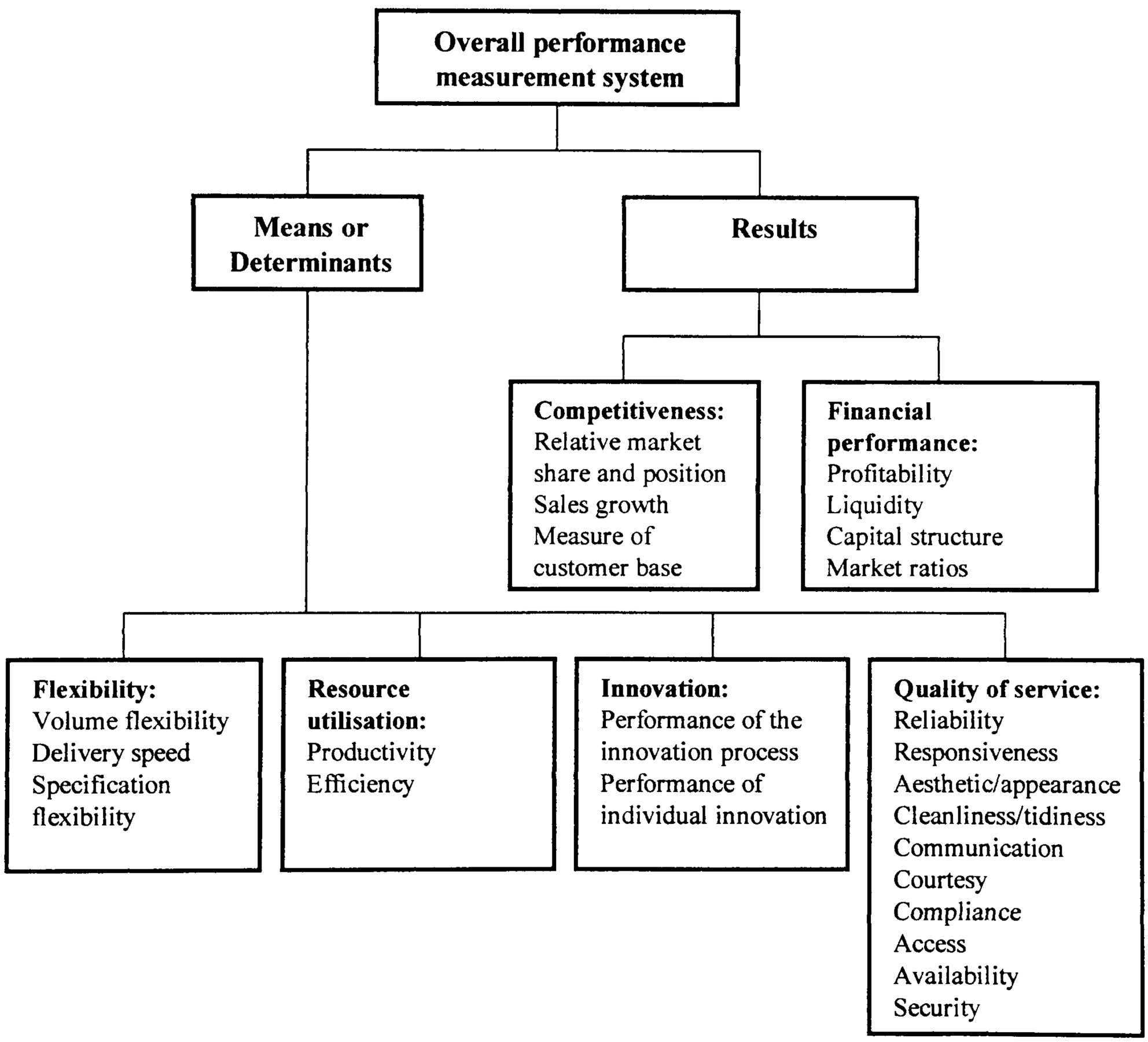

Figure 15. Core elements of a results and determinants matrix
Source: Based on Ghobadian and Ashworth (1994, p.38)

3.3.3.4 The Balanced Scorecard (BSC)

Kaplan and Norton (1992) first devised the balanced scorecard (BSC) as a measurement framework for strategic, operational and financial measures. The concept aims to align corporate values with operational objectives, customer satisfaction, shareholder value and expectations, and individual employees' objectives, competencies and aspirations (Kaplan and Norton, 1992, 1996). The balanced scorecard provides answers to four basic questions: How do customers see us? (i.e. customer perspective); What must we excel at? (i.e. internal perspective); Can we continue to improve and create value? (i.e. innovation and learning perspective); and How do we look to shareholders? (i.e. financial perspective). The principles of BSC give a holistic view of the organisation by simultaneously looking at four important perspectives (see figure 16).

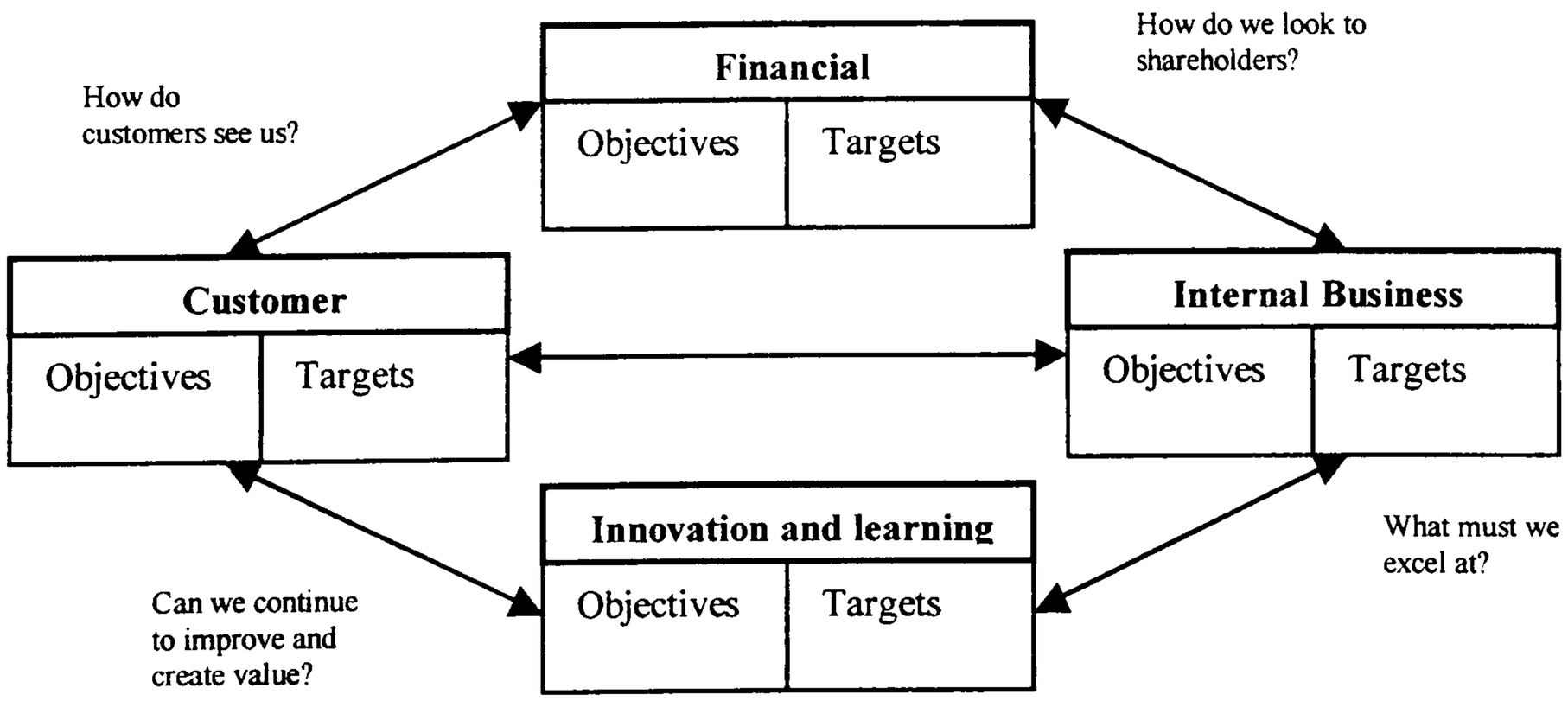

Figure 16. Kaplan and Norton's four-box balanced scorecard
Source: Based on Kaplan and Norton (1992, 1996)

The financial perspective measures how well the business is doing in satisfying the needs of the owners or shareholders who are looking for the return on investments. The customer perspective measures how well the business is satisfying the needs of the customer, so that they will continue with their custom and recommend the business to others. The internal process perspective measures how efficient and effectively the business meets the customer's needs, hence allowing the business to achieve the twin objectives of satisfying customers and making a profit. Finally, the innovation and learning perspective measures the innovation and development of the business in a competitive environment (Bourne and Wilcox, 1998; Kaplan and Norton, 1996). To assure the long-term survival and growth of the business, there has to be a balance between the four perspectives. The BSC helps the management to concentrate on controlling those areas which have the greatest impact for the achievement of strategic objectives. BSC also links strategies to the goals of departments, teams or individuals and makes it therefore possible for employees at all levels to see how they can contribute to the realisation of the strategic objectives (Grünig and Kühn, 2001).

3.3.3.5 The Comparative Business Scorecard (CBS)

Kanji (1998, 2000) extended the four perspectives of BSC and proposed a comparative business scorecard (see figure 17). A few well-defined performance dimensions and critical success factors can help develop specific measures to monitor progress and performance towards excellence. Therefore, companies need to maximise stakeholders value, achieve process excellence, improve organisational learning and delight

the stakeholder (Kanji, 1998; Kanji and Mours e Sá, 2002). Kanji (2001) argues that performance measures require attention by the drivers of success, which primarily are:

1) Delighting the stakeholders - i.e. focusing both on external and internal customer satisfaction;
2) Managing the most important organisational asset, which is its people - i.e. providing them with adequate training for quality and encouraging teamwork;
3) Managing by fact - i.e. analysing the organisational processes and measuring the key variables; and
4) Developing a culture of continuous improvement - i.e. constantly looking for new improvement opportunities and preventing problems from occurring.

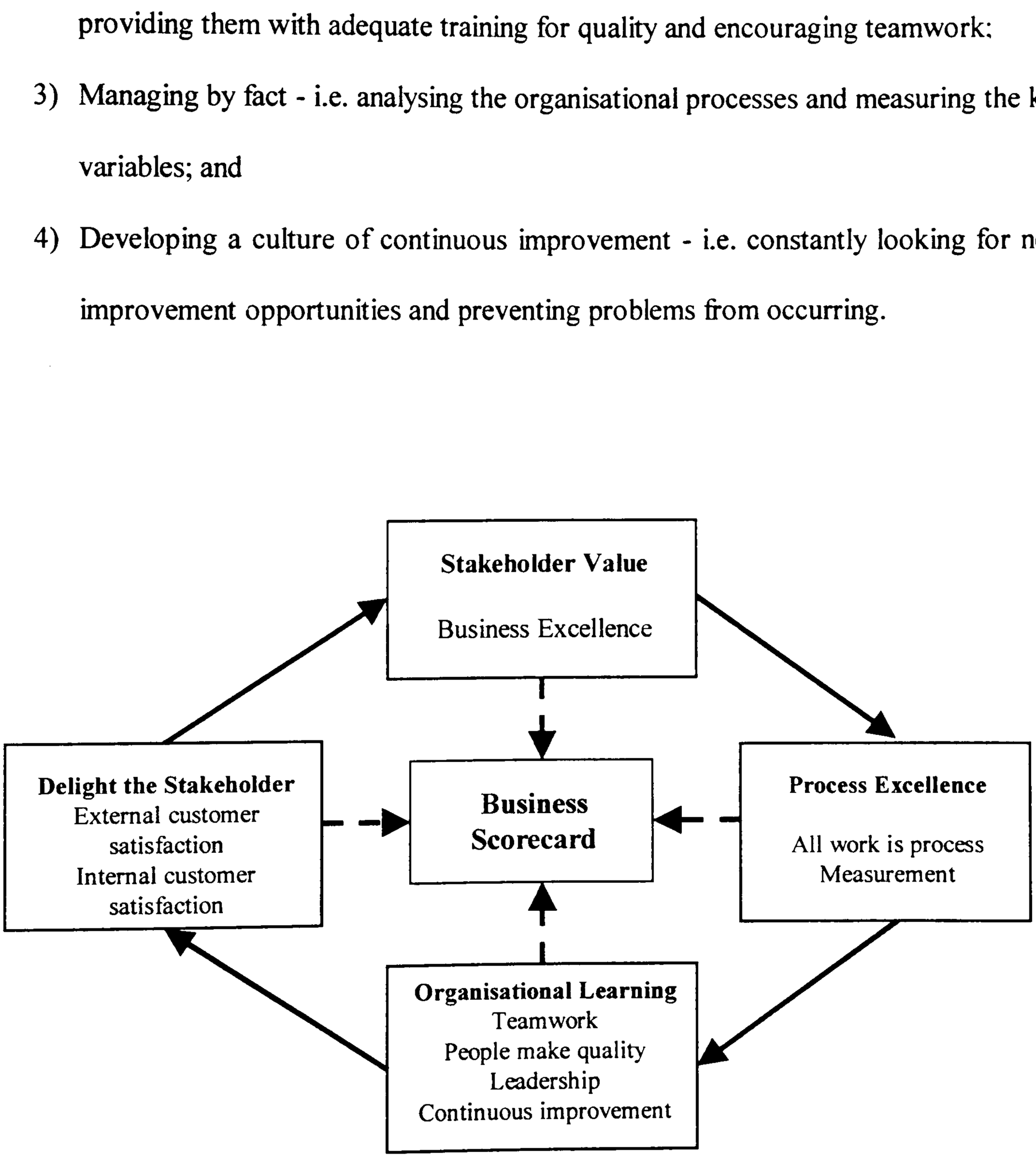

Figure 17. Kanji's Comparative Business Scorecard
Source: Based on Kanji and Moura e sá (2002, p.20)

Moreover, Kanji and Moura e sá (2002) argue that achievements in each of the four areas need to feed each other to form a cycle of continuous improvement, so that: 1) delighting the stakeholders helps generate revenues and satisfactory returns to the investor; 2) increased revenues help find investments in processes and learning; and 3) better process and learning help people to delight the stakeholders and create business excellence.

3.3.3.6 The Cambridge Performance Measurement Process (CPMP)

Neely *et al.* (1996) have developed a management process which is fully described in the workbook *Getting the Measure of Your Business.* It is proposed that the development of performance measurement systems can be divided into three main phases (see figure 18). These are firstly, the design of the performance measures; secondly, the implementation of the performance measures; and thirdly, the use of the performance measures (Bourne *et al.*, 1998; Neely *et al.*, 1996). According to Bourne *et al.* (2000), the design phase can be subdivided into identifying the key objectives to be measured and designing the measures themselves. Implementation is defined as the phase in which systems and procedures are put in place to collect and process the data that enable the measurements to be made regularly. The use of performance measures is split into two main subdivisions. First, as the measures are derived from strategy, the initial use to which they should be put is that of measuring the success of the implementation of that strategy (Kaplan and Norton, 1996). Second, the information and feedback from the measures should be used to challenge the assumptions and test the validity of the strategy (Feurer and Chaharbaghi, 1995b; Kaplan and Norton, 1996).

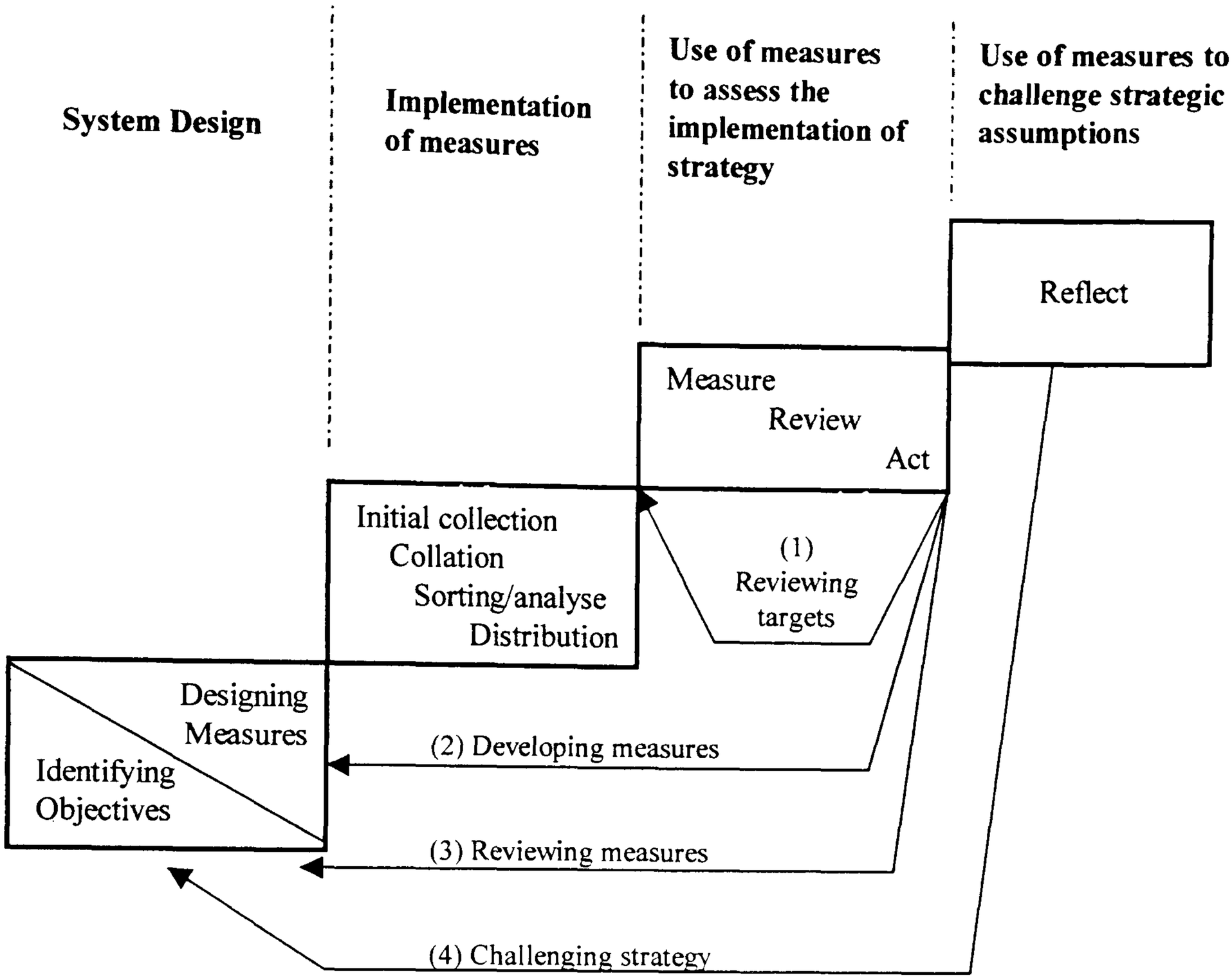

Figure 18. Phases in developing a performance measurement system
Source: Based on Bourne *et al.* (2000, p.757)

Bourne *et al.* (2000) argue that this is the sequence of design, implementation and use phases through which the performance measurement system should progress. However, the phases can overlap as different individual measures are implemented at different rates. Thus, some measures can be implemented before all the measures have been completely designed, and from the author's experience, it is often the case that there is an overlap between implementation and use. Further, the process is not a simple progression from system design to the use of performance measures for challenging strategy. The performance measurement system requires developing and reviewing at a number of different levels as the situation changes (Bourne *et al.* 2000)

3.3.3.7 Consistent Performance Measurement Systems (CPMS)

Flapper *et al.* (1996) proposed a systematic method for designing a consistent performance measurement system to be used in practice where explicit attention is paid to the relations between performance indicators (PIs). The system claims to cover all aspects of performance that are relevant to the existence of an organisation as a whole. Flapper *et al.* (1996) argue that the system offers management quick insight into how well the organisation is performing it's tasks and to what extent the organisational objectives are realised. The method consists of three main steps, namely defining PIs, defining relations between PIs, and setting target values for PIs. From a bottom-up point of view, the task swhich have to be executed within an organisation are the starting point for defining PIs; whereas from a top-down point of view, the starting point for defining PIs are the functions in the organisation responsible for the executing of these tasks (Fortuin, 1988; Kaplan and Norton, 1992, 1996; Wisner and Fawcett, 1991). There are three intrinsic dimensions of PI (see figure 19). These are firstly the type of decision (i.e. strategic/tactical/operational) that is supported by the PI; secondly, the aggregation level (i.e. overall/partial) of the decision; and thirdly, the type of measurement unit (i.e. monetary/physical/dimensionless) in which the PI is expressed.

Based on these dimensions, Flapper *et al.* (1996) suggest a new classification scheme for PIs, including: 1) financial versus non-financial; 2) global versus local; 3) internal versus local; 4) organisational hierarchy; and 5) area of application. Besides, the functions in an organisation and the tasks for which they are held responsible have been assumed.

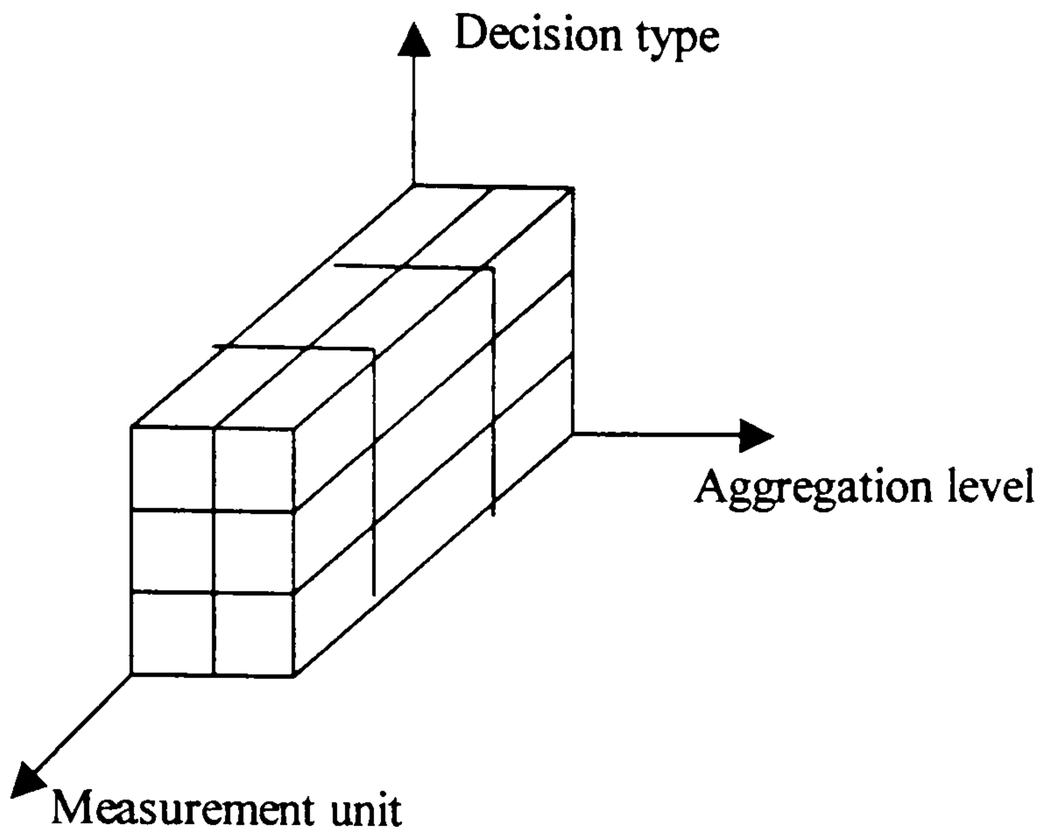

Figure 19. Three intrinsic dimensions for classifying performance indicators
Source: Abstracted from Flapper *et al.* (1996, p.29)

Various PIs would then be defined with respect to two types of relations: relations between the PIs used within the context of one function (i.e. internal relationship), and the relations between the sets of PIs defined for different functions (i.e. external relationships). Flapper *et al* (1996) add that a performance measurement system is not only characterised by its set of PIs but also by the ranges of values triggered by different actions. Starting from a range of values set for a parent-PI, targets are set for the corresponding child-PIs. The target value setting is a negotiation process that requires a top-down/bottom-up approach and involves 'employers and employees' and 'suppliers and customers'. The final responsibility for arriving at a consistent set of PIs for a given function lies with the manager responsible for the performance of the people executing the function.

3.3.3.8 Integrated Performance Measurement Systems (IPMS)

A reference model was developed for integrated performance measurement systems by the research team at the University of Strathclyde (Bititci *et al.*, 1997, 1998a, b). Bititci *et al.* (1997) argue that the performance management process is a closed loop control system that deploys policy and strategy, and obtains feedback from various levels in order to mange the performance of the business. The model is composed of five systems interacting and coordinating in a controlled fashion. A pictorial view of this reference model is provided in figure 20, and a brief description of these systems is given below:

- System 1 is the operational unit that produces the goods or services, and represents the productive function of an organisation.
- System 2 is the local management system that coordinates the activities of operational units. This system represents the business process that contains the business activities of System 1.
- System 3 represents the tactical management system that manages the operations of Systems 1 and 2 by setting targets and priorities. This is the management system that is responsible for the performance of business processes and activities in line with requirements of the higher level systems.
- System 4 is the developmental system that is concerned with the external environment and improvement. By focusing externally, this system identifies the changes necessary to the lower level systems, and identifies the improvement gaps and sets strategies to fulfill corporate objectives.

- System 5 sets the direction, the corporate policy and the objectives the organisation would be adopting in the future. This system sets the corporate priorities and targets.

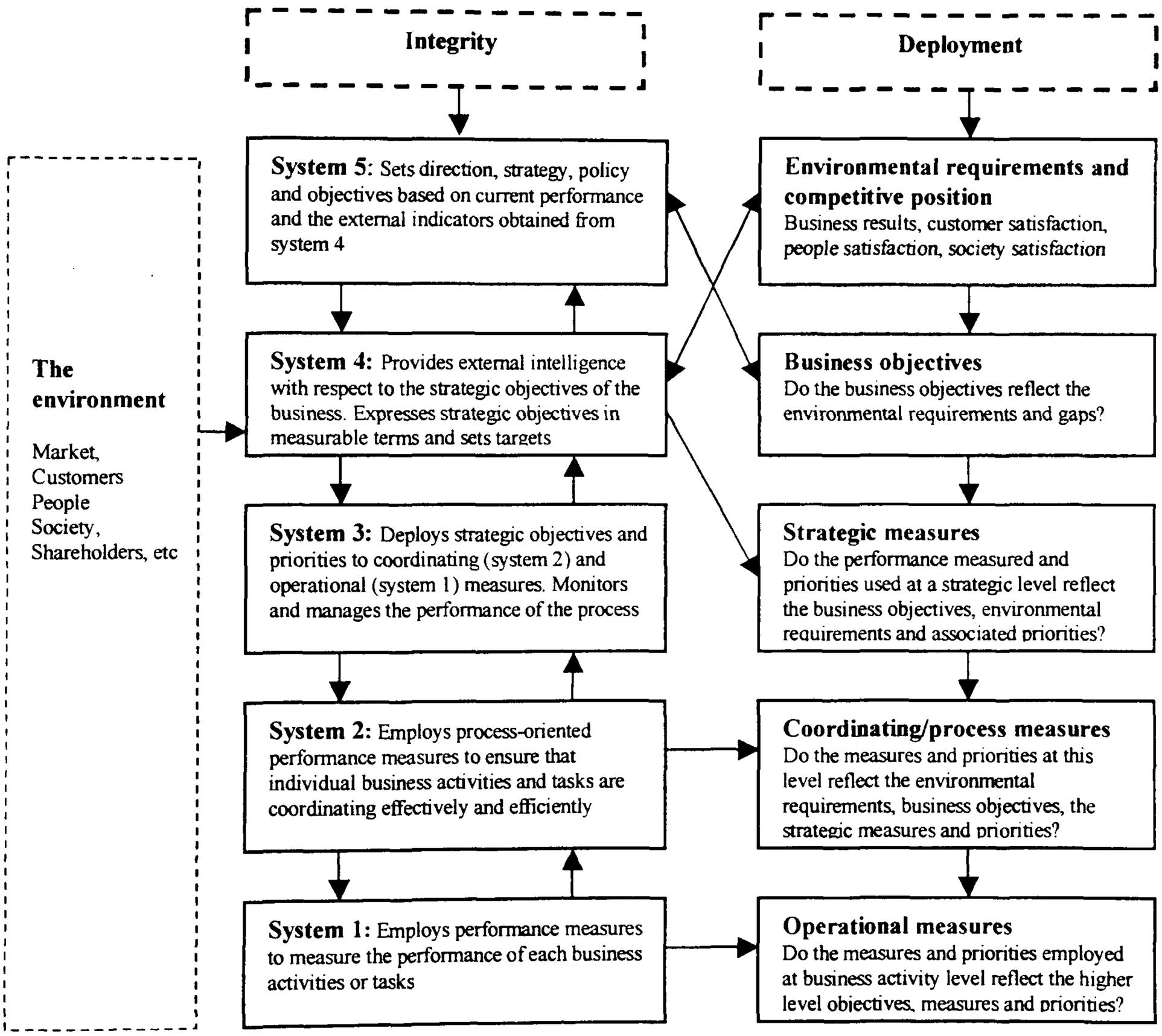

Figure 20. A reference model for integrated performance measurement systems
Source: Based on Bititci *et al.* (1997, p.50)

3.3.3.9 Dynamic Performance Measurement Systems (DPMS)

Bititci *et al.* (2000) researched the structure and relationships within performance measurement systems and explored the use of IT-based management tools as a self-auditing performance measurement system. A dynamic performance measurement system was developed in line with the IPMS reference model (Bititci *et al.* 1997). Bititci *et al.* (2000) identified that the performance measurement system needs to be dynamic and which should have:

- An external monitoring system, which continuously monitors developments and changes in the external environment;
- An internal monitoring system, which continuously monitors developments and changes in the internal environment and raises warning and action signals when certain performance limits and thresholds are reached;
- A review system, which uses the information provided by the internal and external monitors and the objectives and priorities set by higher level systems, to decide internal objectives and priorities; and
- An internal deployment system to deploy the revised objectives and priorities to critical parts of the system

Further, Bititci *et al.* (2000) identified four basic requirements for an IT platform that support the dynamic system framework. The IT platform must:

- Provide an executive information not just a means of maintaining the performance measurement system;
- Be capable of accommodating and incorporating all the elements as specified above;

- Be integrated within the existing business systems (e.g. enterprise resource planning environment), and
- Be capable of handling simple rules to facilitate performance management (e.g. raising of alarm signals, warning notices, etc)

3.3.3.10 Integrated Performance Measurement Framework (IPMF)

Medori (1998a, b) and Medori and Steeple (2000) developed an integrated performance measurement framework, addressing both financial and non-financial measures. The framework structure revolved around a six-stage plan as depicted in figure 21. These stages include:

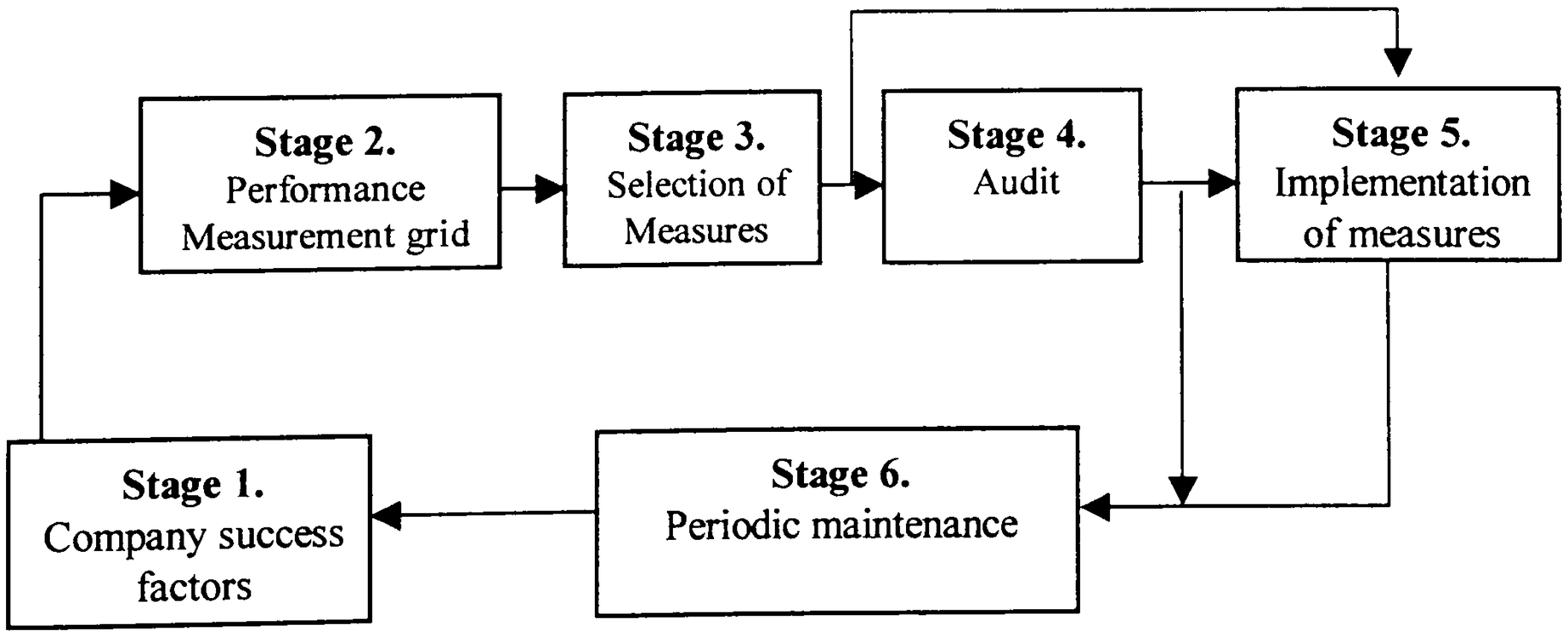

Figure 21. The integrated performance measurement framework structure
Source: Based on Medori and Steeple (2000, p.523)

- Stage 1: Company success factors. This starting point of the framework begins with defining a company's manufacturing strategy. The strategy should also include customer requirements. Once the strategic requirements of Stage 1 are identified, they are then listed in the 'Performance measurement grid' in Stage 2.
- Stage 2: Performance measurement grid (PMG). This stage combines the six competitive priorities (i.e. quality, cost, flexibility, time, delivery and future growth) and matches them to any strategic requirements identified in stage 1.
- Stage 3: Selection of measures using spectrum/checklist. This stage incorporates the use of PMG to identify the general areas which need to be measured, and interrogates a company's spectrum/checklist to select the most appropriate measures for the company.
- Stage 4: Audit. This is to audit a company's existing performance measurement system. Primarily, an existing set of measures are listed down and compared with the new measures that have been identified and selected in Stage 3.
- Stage 5: Implementation of measures. Measures identified in stage 4 as being critical (i.e. gaps) need implementing. This stage also applies to companies implementing an entirely new set of measures identified from Stage 3.
- Stage 6: Periodic maintenance. This stage addresses the periodical reviewing of a company's performance measurement system. This is particularly applicable to companies that change their strategy, implement new technology and so on.

Medori and Steeple (2000) claim that this framework has five main purposes: firstly, it can aid setting-up a new performance measurement system if a company does not have one; secondly, it has an audit capability which can aid in examining a company's

existing measurement system; thirdly, it can aid in identifying obsolete measures; fourthly, it can aid in identifying and selecting core non-financial measures not being measured; and fifthly, it identifies the route to implementing any selected measures.

3.3.4 Analysis of performance measurement systems

An attempt was made to evaluate the ten PM systems as described in previous Sub-section. Hudson *et al.*'s (2001) typology was used a basis for analysis (see table 14). The completeness of these PM systems was evaluated with respect to the synthesis of the dimensions of performance, the characteristics of performance measures and the requirements of effective development processes. A summary of the analysis is given in table 15, and evaluation remarks on individual PM systems are described separately below.

Table 14. An evaluation typology of performance measurement systems

Dimensions of Performance	**Performance Measure Characteristics**	**Specifications and Requirements for PM Development**
Quality	Derived from strategy	Need evaluation/existing PM audit
Flexibility	Clearly defined/explicit purpose	Key user involvement
Time	Relevant and easy to maintain	Strategic objective identification
Finance	Simple to understand and use	Performance measure development
Customer satisfaction	Provide fast, accurate feedback	Periodic maintenance structure
Human resources	Link operations to strategic goals Stimulate continuous improvement	Top management support Full employee support Clear and explicit objectives Set timescales

Source: Based on Hudson *et al.* (2001. p.1102)

Table 15. A comparison amongst ten selected performance measurement systems

Evaluation Criteria of PM Systems	SMART	PMQ	R&DM	BSC	CBS	CPMP	CPMS	IPMS	DPMS	IPMF
A PM system should measure:										
1. Quality	√	√	√	√	√	√	√	√	√	√
2. Flexibility	√	√	√	√	√	√	√	√	√	√
3. Time	√	√	√	√	√	√	√	√	√	√
4. Finance	√	√	√	√	√	√	√	√	√	√
5. Customer satisfaction	√	-	-	√	√	√	√	√	√	√
6. Human resources	√	-	-	√	√	√	-	√	√	-
The measures in a PM system should be:										
7. Derived from strategy	√	-	√	√	√	√	√	√	√	√
8. Link operations to strategic goals	√	-	√	-	√	√	√	√	√	√
9. Stimulate continuous improvement	-	√	√	√	√	√	√	√	√	√
10. Provide fast, accurate feedback	-	-	√	-	-	√	-	√	√	√
11. Clearly defined/explicit purpose	-	-	√	√	√	√	√	√	√	√
12. Relevant and easy to maintain	-	-	-	-	-	√	√	√	√	√
13. Simple to understand and use	√	√	√	√	√	√	√	√	√	√
A PM development process should:										
14. Evaluate existing PM system	√	-	-	-	-	√	-	√	√	√
15. Enable strategic objective identification	-	√	√	√	√	√	-	√	√	√
16. Enable performance measure development	-	√	√	√	√	√	√	√	√	√
17. Provide a maintenance structure	-	-	-	-	-	√	√	√	√	√
18. Involve key users	√	-	-	-	-	√	√	√	√	-
19. Have top management support	√	√	√	√	√	√	√	√	√	-
20. Have full employee support	√	-	√	√	√	√	√	√	√	-
21. Have clear and explicit objectives	-	-	√	√	√	√	-	√	√	√
22. Have set timescales	-	-	-	√	√	√	-	-	-	-

Notes: '√' – indicates compliance

SMART = Strategic measurement analysis and reporting technique (Lynch and Cross, 1991); PMQ = Performance measurement questionnaire (Dixon *et al.*, 1990); R&DM = Results and determinants matrix (Fitzgerald *et al.*, 1991); BSC = The balanced scorecard (Kaplan and Norton, 1992, 1996); CBS = Comparative business scorecard (Kanji, 1998, 2000; Kanji and Moura e Sá, 2002); CPMP = Cambridge PM process (Neely *et al.*, 1996; Bourne *et al.*, 1998); CPMS = Consistent PM systems (Flapper *et al.*, 1996); IPMS = Integrated PM systems (Bititci *et al.*, 1997, 1998); DPMS = Dynamic performance measurement systems (Bititci *et al.*, 2000); IPMF = Integrated PM framework (Medori, 1998a, b)

First of all, the SMART system provides an explicit link between strategy and operations, and also encourages a user-centred design (Lynch and Cross, 1991). Its main strength is its attempt to integrate corporate objectives with operational performance indicators. However, the key problem with this approach is that it fails to specify, in any detail, either the form of the measures or the process for developing them. The SMART system does not provide any mechanism to identify key performance indicators for quality, cycle time, cost and delivery. Besides, the SMART system does not explicitly integrate the concept of continuous improvement (Ghalayini and Noble, 1996).

Similarly, the use of the performance measurement questionnaire (Dixon *et al.*, 1990) as an initial audit tool, ensures that all the dimensions of performance are adequately covered. According to Ghalayini and Noble (1996), the PMQ has the advantage of providing a mechanism to identify the improvement areas of the company and their associated performance measures. In addition, it tries to determine the extent to which the existing measurement system supports such improvement areas. However, as this approach consists of several different tools, it is potentially complicated to understand and use. In addition, it also fails to provide an explicit process for developing the PM system and is inadequate with respect to the human resource dimension (Medori, 1998a). Another weakness of the PMQ, like SMART, is that it does not take into account the concept of continuous improvement (Ghalayini and Noble, 1996).

The main strength of the results and determinants matrix (Fitzgerald *et al.*, 1991; Fitzgerald and Moon, 1996) is that it specifies, in reasonable detail, what the measures should look like and provides a useful development process. However, it does not include

customers or human resources as dimensions of performance and cannot, therefore, give a truly balanced view of performance.

Similarly, the balanced scorecard (Kaplan and Norton, 1992, 1996) integrates four important performance perspectives in one simple and easy-to-use management report. It has good coverage of the dimensions of performance, but provides no mechanism for maintaining the relevance of defined measures. An additional deficiency of this approach is the lack of integration between the top level, strategic scorecard, and operational level measures (Ballantyne and Brignall, 1994) potentially making execution of strategy problematic. Furthermore, it fails to specify a user-centred development process. Kanji and Moura e Sá, (2002) also argue that the causality links suggested among the four perspectives are particularly problematic and ambiguous. Additionally, it fails to recognise explicitly the contributions of important stakeholders, such as employees and suppliers.

The comparative business scorecard (Kanji, 1998, 2000; Kanji and Moura e Sá,, 2002), built upon the strengths of the balanced scorecard, has the potential to give a deeper understanding of how achievements in the different areas feed each other to form a cycle of continuous improvement. Its implementation can help organisations to develop, cascade and implement an organisation's strategy. The main weakness of this approach is that it is primarily designed for senior managers to provide them with an overall view of performance. It does not offer explicit guidance on how to develop and implement a PM system effectively.

The Cambridge PM process (Neely *et al.*, *1*996; Bourne *et al.*, 2000) fulfils all the criteria in the typology and is, therefore, a comprehensive process for the development of strategic PM systems. The development of operational measures, however, is described as an optional process. For it to be classified as comprehensive, both strategic and operational measures need to be developed. The consistent PM system (Flapper *et al.*, 1996) gives a very detailed process for developing and implementing PM systems, but fails to specify a balanced approach for critical dimensions of performance.

In contrast to this, the integrated PM system methodology (Bititci *et al.*, 1997) covers many of the criteria required for a comprehensive PM system. However, the method fails to provide a structured process that specifies objectives and timescales for development and implementation. Bititci *et al.* (2000) in their framework for dynamic PM systems, build on several different concepts to develop a system that has an explicit process for maintenance and for ensuring fast and accurate feedback. Finally, the integrated measurement framework (Medori, 1998a,b; Medori and Steeple, 2000) is also a comprehensive approach, defining the dimensions of performance and providing a mechanism for designing the measures. The unsatisfactory aspect of this approach is the lack of a structured process for overall development.

The analysis shows that the majority of these systems and frameworks covered most dimensions of performance. Many exhibit properties that could be mapped to the characteristics of performance measures and to the requirements of development process. The analysis provides guidance about what to measure and how to design the measures that could be linked to the corporate strategy and objectives of an organisation.

3.3.5 Problems associated with PM systems

The performance measurement revolution has prompted many organisations to implement new performance measurement systems, often at considerable expense (Kennerley and Neely, 2002). Eccles (1991) suggests that it will become increasingly necessary for all major businesses to evaluate and modify their performance measures in order to adapt to the rapidly changing and highly competitive business environment. Numerous authors espouse the need for reflection on measures to ensure that they are updated to reflect this continuous change (Meyer and Gupta, 1994; Ghalayini and Noble, 1996). Moreover, the literature suggests that ineffective management of the evolution of measurement systems is causing a new measurement 'crisis', with organisations implementing new measures to reflect new priorities but failing to discard measures reflecting old priorities resulting in uncorrelated and inconsistent measures (Meyer and Gupta, 1994). There is a danger that failure to manage effectively the way in which measurement systems change over time will cause new measurement systems to lose their relevance, prompting a new crisis and necessitating a further measurement revolution (Kennerley and Neely, 2002).

Neely and Bourne (2000) argue that there are two main reasons why measurement initiatives fail. The first is that performance measurement systems are often poorly designed. The second is that they are difficult to implement. It is all very well to have a clearly defined performance measurement, that is well communicated, but unless the measurement system is successfully implemented, its ultimate impact will be limited. Recent literature research (e.g. Buxton and Ward, 1998; Neely and Bourne, 2000) shows that

many people in organisations appear to find the process of designing a measurement system easier than the process of implementing a measurement system.

There are several reasons for the measurement systems fail, but they can be grouped into two different categories. According to Neely and Bourne (2000), the first set is actually to do with the process of deciding what to measure. Despite its apparent simplicity, far too often managers make fundamental mistakes when deciding what to measure and these in turn make implementation of the performance measurement system almost impossible. Schneier *et al.* (1995) argue that many organisations often measure performance at the individual level and measure sets of criteria that rarely track with the company's strategy. The second set of reasons is to do with the implementation process. Neely and Bourne (2000) argue that even if the right measures have been chosen, decisions can be taken during the implementation phase that make the measures effectively impractical in a particular organisational setting. Moreover, the whole process of measuring performance is wasted unless action is taken on the performance data that are produced.

The emergence of the new manufacturing paradigm is imposing changes on the PM systems (Neely *et al.*, 1995). An organisation needs to assess performance from a wider perspective, such as listening to various stakeholders. The PM system must concentrate on the measurements that are meaningful, that is, on the key areas that determine organisational success or failure (Neely, 1998). Obviously, each organisation is different from the other. However, this does not mean that there are no good general management principles and practices that apply to every organisation. Design of a PM system requires careful preparation, perseverance, and the conviction of management. What is

organisation-specific are the system of beliefs and values and the assets in terms of competencies and core processes.

PM systems must support corporate strategy formulation and monitor value drivers, that is, those elements that really bring competitive advantages or benefits to the organisation. De Toni *et al.* (1997) argue that the new PM systems should be suited to the characteristics of the production systems and the criteria of management adopted, be coherent with the strategies of the firm and give support to their realisation. These measurements must be used in a way that leads to the development of the competencies that will be valued in the future, through a continuous cycle of improvement, innovation and learning (Kanji, 2001; Kanji and Moura e Sá, 2002). Why do performance measurement systems fail to change as organisations change, rendering them irrelevant? This is an important question to answer if history is not to be repeated and organisations are to avoid the expense of another extensive overhaul of their measurement systems (Kennerley and Neely, 2002). It is therefore desirable that performance measurement systems are linked to the espoused strategy and corporate objectives of an organisation.

3.4 Linking Total Quality Management, Business Excellence and PM

3.4.1 Concepts of total quality management and business excellence

The concepts of Total Quality Management (TQM) and Business Excellence (BE) have come to the fore in recent times, being adopted by organisations as the means of

understanding and satisfying the needs and expectations of their customers and taking costs out of their operations (Dale, 1999; Ross, 1993). TQM is an integrated management philosophy and set of practices that emphasise continuous improvement, meeting customers' requirements, reducing rework, long-range thinking, increased employee involvement and teamwork, process redesign, competitive benchmarking, team-based problem-solving, constant measurement of results, and closer relationships with suppliers (Powell, 1995; Whitney and Pavett, 1998).

TQM refers to a basic vision of what an organisation should look like and how it should be managed. It includes a stakeholder perspective, customer and people orientation and corporate responsibility (Dale, 1999; Ross, 1993; van Schalkwyk; 1998). TQM creates an organisational culture that fosters continuous improvements in everything by everyone at all times, and requires changes in organisational processes, strategic priorities, individual belief, attitudes and behaviors (Dale, 1999; Shin *et al.*, 1998). The shift from traditional management to TQM is revolutionary and the implementation of TQM involves a fundamental change in the way in which business is conducted (Bounds *et al.*, 1994). Those changes include making customers a top priority, a relentless pursuit of continuous improvement of business processes, and managing the systems of the organisation through teamwork.

The pursuit of corporate excellence as a way of managing businesses has been increasingly recognisable and has led, among others to the formation of the European Foundation for Quality Management (EFQM) in 1988 (Hakes, 1997). The EFQM subsequently developed its business excellence model and used it as a framework for the

award of the European Quality Award (EQA) and the associated national quality awards (Adebanjo, 2001; EFQM, 2002). The EFQM model was largely based on the concept of TQM as both a holistic philosophy and an improvement on other TQM-based models, such as the Malcolm Baldrige National Quality Award (MBNQA).

Recent developments of these national and regional quality awards serve as models of TQM and offer a blueprints and/or tools for self-assessment and benchmarking (Pun *et al.*, 1999). If used properly, these tools will help organisations evaluate their current level of performance, identify and prioritise areas for improvement, integrate improvement actions in their business plan and identify best practice (Adebanjo, 2001). The opportunity to carry out future assessments against these models also means that progress towards excellence can be measured and promotes continuous improvement. The TQM approach to performance measurement is consistent with business excellence initiatives under way in many companies: cross-functional integration, continuous improvement, customer-supplier partnerships and team rather than individual accountability. In addition, corporate efforts to decentralise decision-making through empowerment, improved efficiency, increased cooperation and execution of strategy are consistent with the balanced scorecard framework of performance measures (Kanji and Moura e Sá, 2002; Walker, 1996).

3.4.2 Evaluation criteria of TQM-business excellence

Organisations operate in a dynamic marketplace and their success depends upon meeting the changing needs of stakeholders (Atkinson and McCrindall, 1997; Austin,

1996). These stakeholders include the management, employees, customers, suppliers, shareholders and the community at large. The MBNQA and the EQA are at present two of the more widely used TQM-business excellence frameworks (NIST, 2002; EFQM, 2002). The former was first introduced in the USA in 1987 and has eleven core values and concepts; whereas the latter was introduced in Europe in 1991 and has eight fundamental concepts (see table 16). Both awards consider the management and provision of resources, and emphasise the importance of innovation and learning (Russel, 2000). They have their own requirements that can be served as evaluation criteria for assessing a company's performance. Integrating TQM concepts with performance measures becomes an imperative in the pursuit of excellence.

Table 16. The underpinning principles of two business excellence models

Core values of MBNQA	Fundamental concepts of EQA
• Customer driven	• Customer focus
• Visionary leadership	• Partnership development and involvement
• Organisational and personal learning	• People development and involvement
• Management by fact	• Management by processes and facts
• Value employees and partners	• Continuous learning, innovation and improvement
• Agility	• Leadership and constancy of purpose
• Public responsibility and citisenship	• Public responsibility
• Managing for innovation	• Result orientation
• Focus on results and creating values	
• Focus on the future	
• System perspective	

Sources: Based on NIST (2002) and EFQM (2002)

Both MBNQA and EQA adopt a result-oriented approach by balancing the needs of various stakeholder groups. They use a point scoring system, and are similar in the sense that both of them give a greatest weight to the results (NIST, 2002; EFQM, 2002).

According to the 2002 version of both awards, the Business Results criterion in the MBNQA is 450 points leading to a 45 percent out of 1,000 points (including customer-focused, financial and market, human resource, and organisational effectiveness). The Leadership criterion receives the second largest scores of 12 percent and the Information and Analysis criterion the third with 9 percent in the MBNQA. Other MBNQA criteria (including Strategic Planning, Customer and Market Focus, Human Resources Focus, and Processes Management) have the same scores of 8.5 percent for each. For the EQA, the Results criterion is 50 percent, including customer, people, society, and key performance. The Processes (i.e. 14%), Leadership (i.e. 10%), People (i.e. 9%), Partnership and Resources (i.e. 9%), and Policy and Strategy (i.e. 8%) criteria are ranked second, third, fourth, fifth, and sixth with respect to their relative ratings. A comparison of the evaluation criteria and link between MBNQA and EQA is depicted in figure 22.

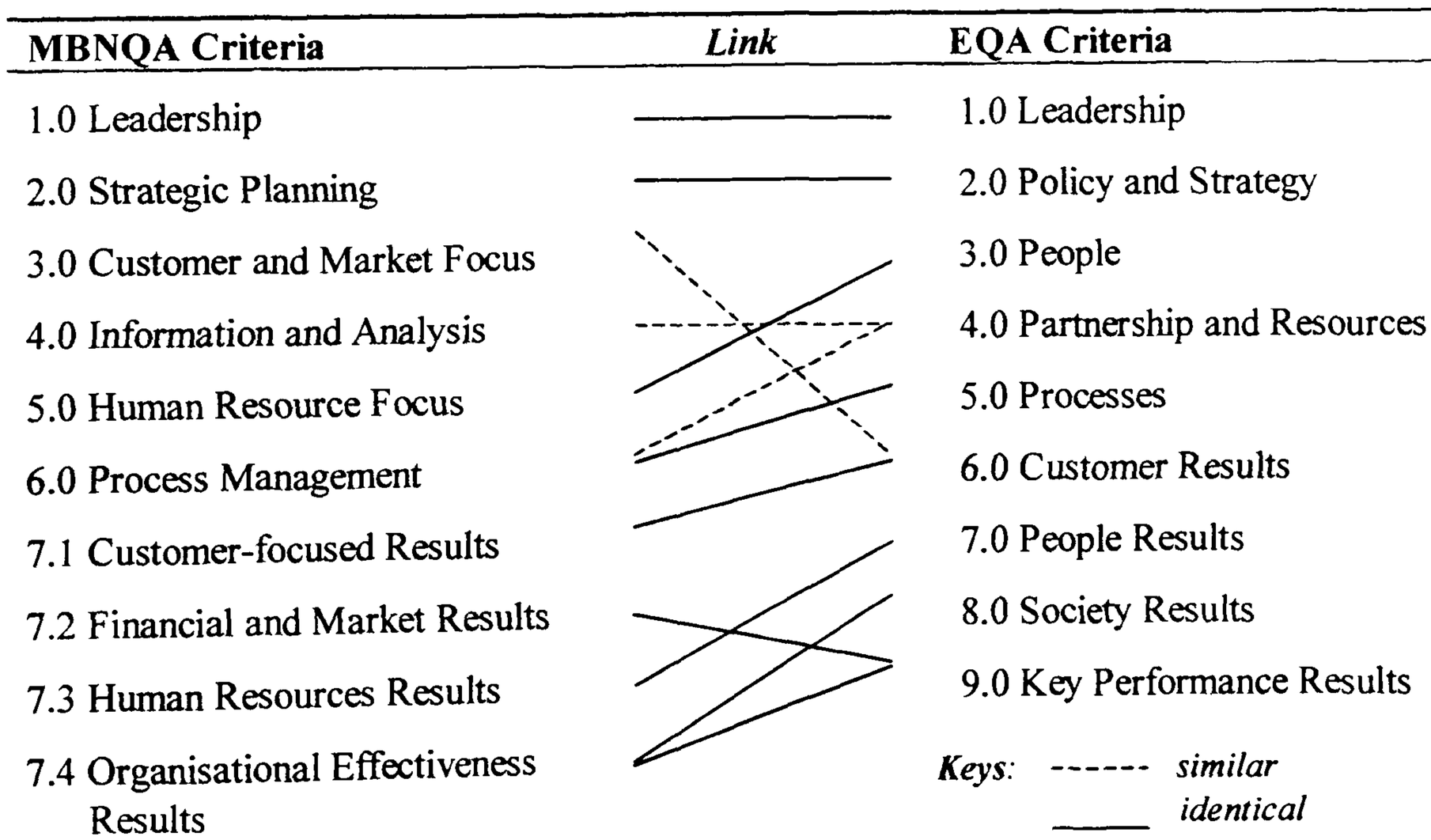

Figure 22. A comparison of MBNQA and EQA criteria
Source: Based on NIST (2002) and EFQM (2002)

A detailed comparison of the two business excellence awards makes visible that, in principle, comprise equal requirements. Both awards demand supportive leadership patterns. Policy and strategy be based on quality principles, systematically deployed and transformed into action. An organisation has to identify and permanently review its processes. It must credibly to come up with the interests of all stakeholders and of the society as a whole. Concerning leadership, both awards are mostly equal in content and scope. Executives must show credible dedication to the TQM process. The management has to develop a supportive policy and strategy and provide appropriate resources.

In terms of strategic policies and strategies, both models demand a structured process to determine the corporate vision and objectives. Policy and strategy shall be based on the TQM concepts and relevant information. They must be systematically deployed and transformed into operative plans (Vob, 2001). Nevertheless, both awards pursue different approaches in the context of customer orientation. The MBNQA directly assesses the organisation's proceedings to determine customer requirements and to transform them into processes, products and services. The management of customer relationships shall aim at simplifying co-operation processes and at establishing trusting and long-term partnerships (NIST, 2002). On the contrary, the EFQM does not comprise equally detailed requirements on customer orientation itself. Instead, it addresses the structural preconditions to ensure compliance with customer demands (EFQM, 2002).

While both awards are on a par concerning the use of information and people orientation, the EFQM comprises more sophisticated criteria on resource operations and conservation since it explicitly addresses the use of corporate funds that is neglected by the

NBNQA. They prescribe a systematic approach for education and training, for internal communication as well as for recognising and appreciating individual and team performance. Both concepts additionally assess the organisations proceeding on people empowerment (Vob, 2001). Regarding process management, both awards attach major importance to process control and to review and improvement cycles. The most significant divergences apply to the assessment of product and service quality. The EFQM model considers the structural preconditions, i.e. processes, resource operations, as well as qualified and motivated employees. Besides, it takes into account how customers perceive the level of quality in order to evaluate the organisation's performance (EFQM, 2002). On the contrary, the MBNQA directly assesses product quality. An organisation has to monitor product quality. Thus the award complies better with traditional notions of quality. When addressing business results, both awards consider all data to describe and document the organisation's performance as well as the benefits stakeholders and the society as a whole can gain from its business (Vob, 2001).

Both MBNQA and EQA propagate the TQM principles and stress the importance of measurement for identifying and monitoring improvement (Porter and Tanner, 1996; Vob, 2001). They share a set of fundamental concepts and elements, including leadership and constancy, results orientation, management by processes, people development and involvement, and continuous improvement. A list of TQM-business excellence concepts and performance measures is depicted in table 17. The list is not meant to be exhaustive and will change as organisations develop and improve. Companies need to focus on long-term benefits from systematically implementing these concepts and elements, rather than simply trying to pass the point scoring system of both awards. Wang and Ahmed (2001)

argue that winning a business excellence award does not end a long journey, but affirms that the performance improvement progress is on the right track.

Table 17. The TQM-business excellence concepts and performance measures

Core Concepts	Descriptions
1. **Leadership and constancy of purpose**	• Top management recognises its roles and responsibilities to set directions, management principles and vision, and develops strategies and policies. • Management should exercise its involvement and commitment in developing the management structure and environment in which the organisation and its people can excel to achieve the organisation's objectives.
2. **Management by processes**	• Using reliable information and analysis of data make effective decisions for the current operations and planned improvements. • More predicable results can be obtained and achieved more efficiently when the inter-related activities are managed as a process. • Improvements are made though sharing of information and knowledge and effective implementation of organisational strategies and policies.
3. **People development and involvement**	• Through shared values, trust and empowerment, which encourages the involvement of people in all levels in the organisation to best release their full potential to be used for organisation's benefit. • Achieving the highest levels of employee performance requires well-developed people education and training and adoption of ethical approach to promote people well-being and satisfaction.
4. **Continuous improvement**	• The resources are planned, managed, and improved with continuous review and update of strategies and policies. • The importance of continuous innovation with the emphasis of learning culture should be developed and maintained. • Excellence is dependent upon balancing and satisfying the needs of all relevant stakeholders.
5. **Results orientation**	• The customer is the final arbiter of product and service quality and customer loyalty, retention and market share gain are best optimised through a clear focus on the needs of current and potential customers. • An organisation works more effectively when it has mutually beneficial relationships with its people and partners focusing on both financial and non-financial results and organisational effectiveness. • The long-term interest of the organisation and its people are best served by exceeding the expectations and regulations of the community at large.

Sources: Based on NIST (2002) and EFQM (2002)

3.4.3 The TQM-BE-PM integration and self-assessments

Recent research suggests that both TQM and PM can produce economic value to many firms (Dale, 1999; Kanji, 2001). One of the best indicators is the achievement or competitive advantage obtained from integrating TQM-business excellence concepts into performance measures. The integration has to comprise a thorough definition of measures and indicators to monitor the TQM implementation process and corporate performance from a stakeholder perspective. Many researchers and practitioners believe that few well-defined performance dimensions and critical success factors can help develop specific measures to monitor progress and performance towards excellence (Kanji, 2001; Neely *et al.*, 1995). In many circumstances, these measurement systems are embedded in the critical success factors (CSF). Despite being at some extent organisation- or industry-specific, these factors can be grouped into some principles that have been systematically proven to be universally valid. Kanji (2001) argues that the criteria for performance measures are rooted in these factors of the organisation and ultimately correspond to the determinants of business excellence. Various balanced scorecard techniques (Kaplan and Norton, 1996) and various excellence awards (EFQM, 2002; NIST, 2002) are examples that incorporate the principles identified using a CSF approach and have been empirically tested and validated in different contexts.

Lengyel (2000) argues that the strategic goals of the performance measures are an important input for the continuous improvement of quality systems. The ultimate objective of integrating TQM-business excellence with performance measures is to assist organisations in their quest for continuous improvement and better results. If efforts focus

solely on conformity of current management systems and practices, there may be a separation between TQM, BE and PM reversing a trend toward the integration. The integration should align with corporate missions and strategies, and intertwine with the operation goals, management systems, measurements and practices. This mandates continuous self-assessment to identify relevant factors that help with organisational changes.

Self-assessment is a comprehensive, systematic and regular review of an organisation's activities that ultimately result in planned improvement actions (EFQM, 2002; Henderson 1997). The assessment process helps organisations identify their strengths and shortcomings and best practices where they exist (Neely, 1998). According to Hillman (1994), the three main elements in self-assessment are *Model*, *Measurement* and *Management*. The objective of self-assessment is to identify and act on the areas of the improvement process that require additional effort, while recognising and maintaining that which is already going well. Karapetrovic and Willborn (2001) add that self-assessments are aimed at identifying strengths, weaknesses and opportunities for improvement. With the common direction and an increased consistency of purpose, self-assessments can provide organisations with opportunities to build greater unity in pursuit of initiatives that effect improvement (Hakes, 1996; Hill, 1996; Shergold and Reed, 1996). They do not only generate the results and valuable inputs into the annual corporate planning cycle, but also encourage the integration of a range of quality initiatives and performance improvements that may have been separately pursued across the organisation (Beasley, 1994; Pun *et al.*, 1999; Van der Wiele and Brown, 1999). In other words, self-assessment is a means that helps organisations to analyse their status quo in integrating TQM-business excellence with

performance measurement in achieving the strategic objectives. Adebanjo (2001) also argue that one key benefit of the use of the business excellence models is the opportunity for self-assessment and benchmarking.

Henderson (1997) argues that organisations must establish their performance measurement systems with self-assessment orientation. Otherwise, this may result in fragmentation of efforts, slow response and weak productivity growth in the organisations. Business environment and operational situations vary in different organisations. The identification of various critical success factors or indicators provides a feasible means for linking TQM-business excellence concepts and performance measures strategically (Kanji, 2001). The integration will bring changes to the current operations and practices, and will only succeed if they are implemented as a long-term organisational paradigm shift, but not a quick fix (Bounds *et al.*, 1994). Macdonald (1993) argues that the changes are not really about technology or new management tools, but are concerned with culture, value, management, people and communication. In some cases, the changes can be an area-by-area evolution with minor course corrections, or can be more complex and dynamic in many organisations. Senior management must therefore take the lead, commit to the integration, and push it downward throughout the organisation (Pun *et al.*, 1999). Integrating the TQM-business excellence concepts into performance measures incorporates the perspectives of organisational management and requires overall involvement and participation to achieve the company goal. It is crucial to have the stakeholders (including the management, employees, and customers, etc) involved in the design, implementation, on-going development and maintenance of an integrated system.

3.5 Linking PM with Strategy Development and Deployment

3.5.1 Strategy development and deployment

It has been summarised that manufacturing enterprises need to formulate viable strategy and tactics that can meet the needs and requirements of their users/customers. They need to determine what makes the most sense in the light of their position in the industry and their objectives, opportunities and resources. A wide range of conceptual frameworks exists for the formulation of strategies (see Section 2.5 of *Chapter Two*). As the concept of strategy embraces the overall purpose and performance goals of an organisation, its substance cannot be separated from the process of strategy development and deployment in any organisational setting. According to Feurer and Chaharbaghi (1995a), strategy development addresses an ongoing process of analysing the competitive environments and developing strategic options together with their evaluation. The development process takes into account the required implementation time frame and the span of the strategic gap and helps translate measurable performance results (Pun *et al.*, 2000d). It is crucial for the management to identify the gaps prevalent in their organisation, determine the factors responsible for them and develop appropriate solutions.

Strategy deployment can be defined as a process to transmit strategies and their attendant action plans throughout the organisation (Barnard and Wallace, 1994). Band (1994) argued that successful delivery of strategy to the customers depends on the ability to develop a coherent strategy and to deploy it effectively throughout the organisation. The deployment process involves the translation of corporate mission and objectives into action plans, the allocation of resources, and the selection and assessment among various strategic

alternatives, and more importantly, the measurement of performance. Therefore, strategy development and deployment would govern the business operations and performance management of manufacturing enterprises.

3.5.2 Quality function deployment, hoshin kanri *and PM*

Quality function deployment (QFD) is a comprehensive quality management tool specifically aimed at satisfying customers' requirements. Akao (1990) defines QFD as a method and technique used for developing a design quality aimed at satisfying consumer and then translating the consumer's demands into design targets and major quality assurance points to be used throughout the production stage. It uses visual matrices that link customer requirements, design requirements, target values and competitive performance into one chart. Ravelle *et al.* (1998) regard QFD as a system and procedures to aid the planning and development of products/services, and assure that they will meet to exceed customer expectations. A QFD system is of particular relevance when customer-defined attributes of quality may involve trade-off with other attributes (Akao and Mazur, 2003; Cohen, 1995). It focuses on delivering value by seeking out both spoken and unspoken needs, translating them into actionable services and communicating them throughout an organisation. Figure 23 illustrates how QFD facilitates the building of the performance attributes, the houses of quality (HoQ) matrices (i.e. process and strategy matrices) along with the process of strategy development/deployment and performance measurement. Using the technique can help organisations to understand the purposes and functions of their products and services, their business operations and performance

management (Akao and Mazur, 2003; Pun *et al.*, 2000d). The keys to HoQ are the planning and the counterpart delivery processes that must be developed prior to deploying resources. These prevent expensive process changes after the product/service has been designed and introduced. QFD allows the organisation to prioritise the customers' requirements, to compare objectively with the competitors and then direct to optimising those service aspects that will bring the greatest competitive advantage (Cohen, 1995; Hunt and Xavier, 2003; Revelle *et al.*, 1998).

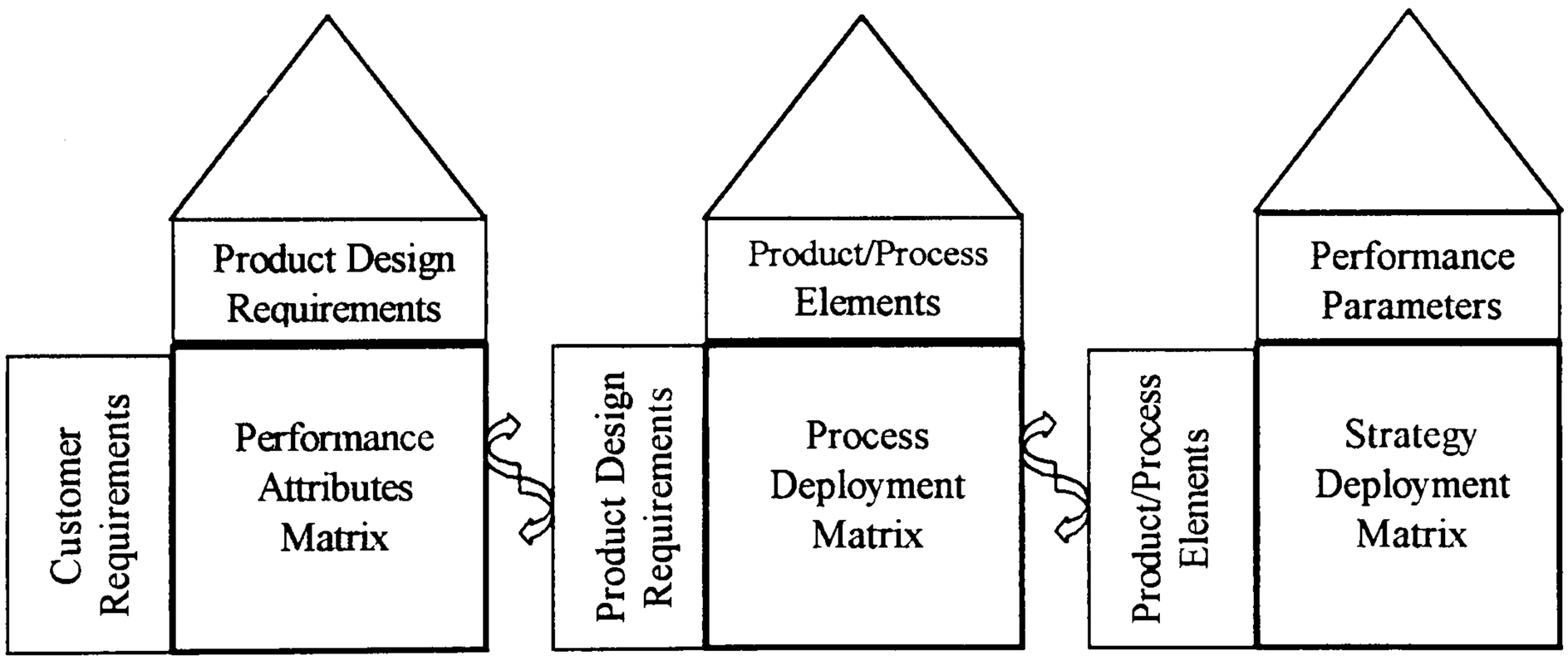

Figure 23. The building of performance attributes, process and strategy matrices
Source: Based on Pun *et al.* (2000d, p.158)

The process of strategy or policy deployment (or so-called *hoshin kanri*) links the organisational strategy to day-to-day work and the performance goals of an enterprise. It is composed of the setting of strategic objectives, the management of the company's direction focus, and daily control of the business (Akao, 1991; Total Quality Engineering, 2003). It helps top management to develop business strategies and policies, providing the focus for

carrying them forward into the management of the individual function and section. Corporate policies and strategies are translated into more specific, detailed actions and concrete goals. The action plans at given level of the company are linked to the objectives of the level above (Cowley, 1997; Forturn and Vaziri, 1992). The means to achieve a particular target at one level become the ends of the lower level, and the measures at one level become the targets of the next. This is a system of forms and rules that encourage employees to analyse situations, create plans for improvement, conduct performance checks, and take appropriate action. Duarte (1993) advocates a four-step *hoshin* process to achieve these targets. The process encompasses:

1) Preparation of the organisation to create policies that will change the way it does business.
2) Creation of implementation plans, using input from key customers and managers from the organisation's key activities.
3) Deployment of the policies through a schedule of regular updates and follow up and by committing resources to ensure accomplishment of the goals and objectives; and
4) Revisit of the first three steps during the annual review to ensure continuous improvement of the process.

Any shortcomings of *hoshin kanri* in vision development can be overcome by integrating QFD (Hunt and Xavier, 2003). Using both tools can spread the process of strategy formulation, deployment and performance measurement throughout the organisation, with each level experiencing its own contribution (Feurer *et al.*, 1995; Pun *et al.*, 2000d). Figure 24 depicts an integrated process of QFD/*Hoshin*/PM from corporate level via business down to functional, divisional and individual levels. The process brings

the resultant strategies into the management of individual functions and sections, with respect to the identification of performance attributes and the deployment of process and strategies.

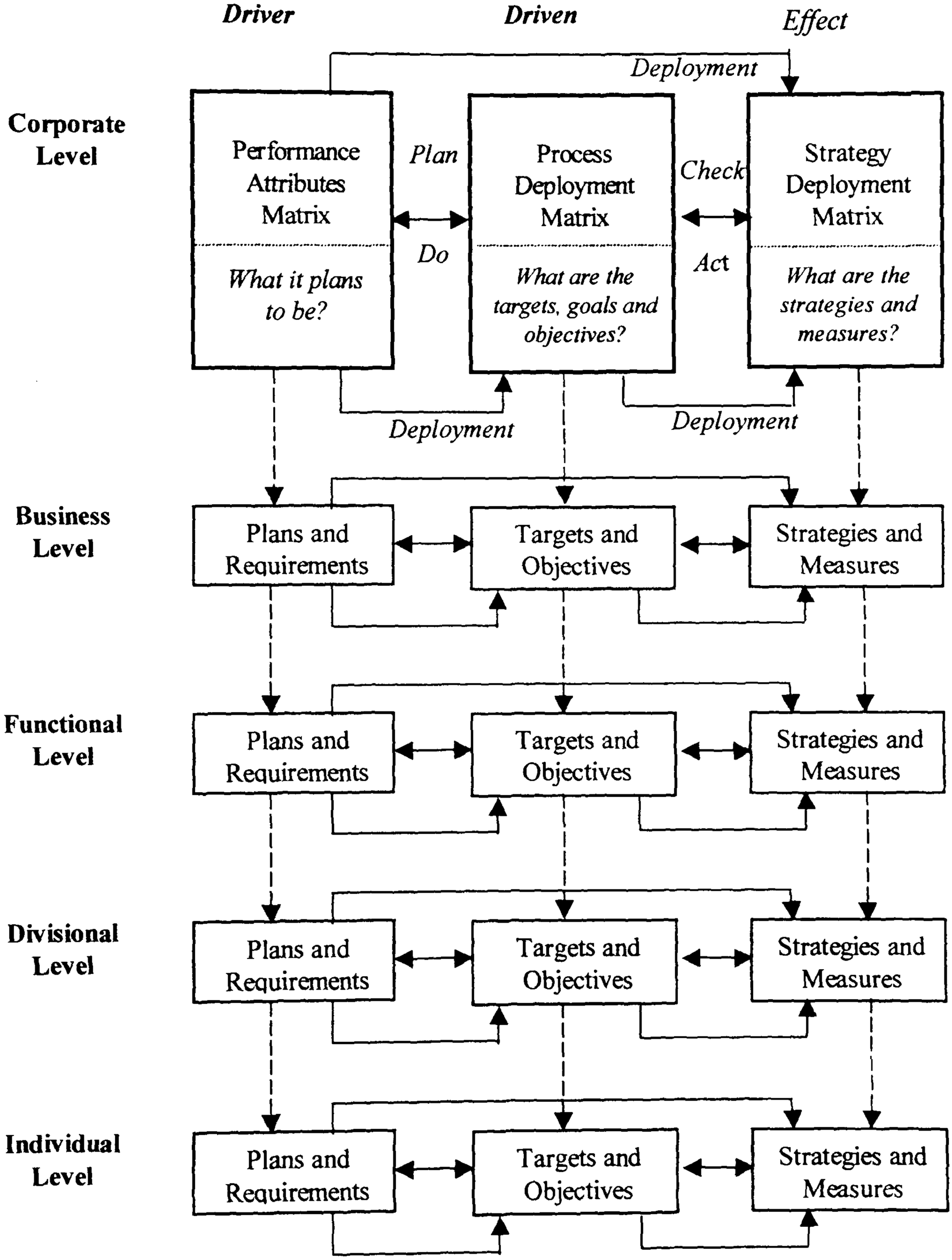

Figure 24. An integrated QFD/Hoshin/PM process
Source: Abstracted from Pun *et al.* (2000d, p.159)

QFD and *hoshin kanri* techniques are holistic in their nature and multi-functional in their application. They provide clear and measurable milestones to control implementation and self-document to facilitate review, corrective action and organisational learning (Hunt and Xavier, 2003). Both derive from a cause-and-effect mentality where targets or objectives are translated into means in a cascading system down through the organisation (Hunt and Xavier, 2003). The QFD/*hoshin* process adopts the "Plan, Do, Check and Act" (PDCA) cycle, and underline feedback to continuously improve the performance of the organisation (Lee and Dale, 1998). The process produces a set of connected tasks to deploy, which are highly predictive in realising the strategy (Hunt and Xavier, 2003), and also enables employees to be contributing directly to attain the company objectives and performance goals (Pun *et al.*, 2000d).

3.5.3 Applicability of QFD and hoshin kanri *in strategic PM*

As competitive environments and priorities change over time, organisational development and business growth rely significantly on sound strategy development and deployment and performance measurement (Lee and Dale, 1998). Like other business and public sector organisations, manufacturing enterprises have to determine their own development paths, and deploy their corporate, business and functional strategies effectively. Unfortunately, strategy development and deployment has become more elusive as the number of factors characterising the strategy increases. Performance measurement has become more complicated as the number of determinants governing the performance emerges (Pun *et al.*, 2000d).

In recent years, many practitioners and academics have recognised the potential of the QFD and *hoshin*-based approaches to strategy formulation and performance measurement. These approaches have been proven useful in identifying quality and performance attributes and deploying processes and strategies as cited in many successful application cases across different industries (see Chien and Su, 2003; Crowe and Cheng, 1995; Hunt and Xavier, 2003; Lee and Dale, 1998; Lowe and Ridgway, 1997; Philips *et al.*, 1994; Pun *et al.*, 2000d; Yoshizawa, 1993). Compiled from the descriptions of their applications, the recorded benefits of utilising these approaches to strategy and performance measurement can be summarised below:

- They develop collaboration between individuals, divisions and departments across the entire organisation.
- They facilitate the development of a sense of ownership through the involvement of many individuals. This ownership then drives the strategy formulation, development and deployment processes.
- They identify stakeholders' needs and enforce a methodical and comprehensive analysis of all relevant relationships. Emotions and politics are to a large degree removed from the process.
- The matrices provide a comprehensive document of the data used and decisions taken in strategy formulation and performance measurement. The completed matrices can also be reused dynamically to allow a rapid refocusing of strategy and performance goals if circumstances change.
- They maintain consistency with the firm's capabilities, and are an excellent mechanism for integrating the key stages of strategy formulation and performance measurement.

3.7 Concluding Remarks

As the rate of change accelerates and competition intensifies globally, a company's survival is dependent on how well it can position itself and how it optimises its efforts. The success and continuity of the organisation depends on its performance. Cost, quality, flexibility, delivery and innovation are well-established competitive performance priorities. A performance measurement system covers these priorities and other aspects of performance that are relevant for the existence of an organisation. Recent business literature gives much prominence to balanced scorecards, total quality management, business excellence models, as well as other emerging PM systems (e.g. CBS, CPMP, IPMS, DPMS and IPMF) for assessing enterprise performance. Most of these systems and approaches share the basic understanding that today's dynamic and competitive marketplace requires measures of the critical aspects of performance.

Manufacturing enterprises are using performance measurement systems in many different ways. A major question for management is how well these systems support the effectiveness and efficiency of key functions and processes in their organisations. These systems must offer management quickly insight into how well organisations are performing their tasks and to what extent their objectives are realised. There is also the need to support and verify the performance improvement initiatives. These systems must link to the achievement of strategy via 1) greater focus on creating stakeholder value, 2) the vogue for moving away from functional management and towards business process management, 3) delighting the stakeholder and motivating people, and 4) making improvements and innovations to services and products (Kanji, 2001).

Measurement systems are not simply designed and implemented, but they also evolve over extended periods of time (Neely and Bourne, 2000). Differences emerge when examining how these systems link measurement to strategic and operational performance. Other differences arise when examining how each framework promotes communication about what is important (and what is not important) in the management and work practices (Buxton and Ward, 1998). Many manufacturing enterprises select, develop and use different performance measurement systems according to their relevancy to organisational needs. These systems succeed when they provide relevant facts and data on what is good about current performance and what needs to be improved either immediately or for the future. Meanwhile, performance measurement is to validate the effectiveness of strategy formulation, development and deployment in quantitative and/or qualitative metrics. This fits well into quality management philosophy (e.g. TQM, continuous improvement and self-assessment), embracing the principles of business excellence models. Recently, the interest in TQM-business excellence has been fuelled with a range of national and regional awards (such as, MBNQA and EQA). These awards are being increasingly used by organisations as part of the business improvement process and strategic benchmarking.

Effective enterprise management depends on effective measurement of performance and results. The pre-condition to improve, and ultimately to achieve business excellence, is to develop and implement a system for performance measurement that can align with a company's strategies and facilitate consistent organisational actions toward corporate goals. Performance measurement is too important and too costly to get wrong. By measuring the right quantities, an organisation can identify where to improve and how the limited resources can be used more effectively for performance improvement. This chapter vets through the determinants and design

of performance measures and contrasts the characteristics of emerging PM systems. It also discusses the underlining motives and criteria that integrate the TQM-business excellence philosophies and practices with performance measures. Besides, the holistic link between PM and strategy development and deployment is explained along with the identification of performance attributes and the deployment of processes and strategies using QFD and *hoshin*-based approaches. The concepts and substances reviewed are important to manufacturing strategy formulation and performance measurement. They are used as key inputs to the design of a subsequent empirical study and the development of a paradigm for integrating strategy formulation and performance measurement in manufacturing enterprises.

Chapter 4

Challenges in Manufacturing Industries: Hong Kong and Shanghai

4.1 Introduction

The rapid and sustained economic growth experienced throughout the Asia Pacific region over the last few decades has led many economists to label the twenty-first century as the Asia Pacific Century (Australia National University, 1995; OECD, 1997). Several sources forecast that China will be the world's second largest economy by 2005 (Australian National University, 1995) and the world's largest economy by 2020 (OECD, 1997). Hong Kong is a newly industrialised economy in the Asia Pacific region and a special administrative region of the People's Republic of China, while Shanghai is typical of large industrial cities in China. Recent developments of the World Trade Organisation (WTO) and a multitude of other international trade agreements have forced manufacturing enterprises in both cities to face a new era of intense global competition. They have to compete effectively not only in the local context, but in wider regional and global marketplaces. This chapter reviews the strengths, weaknesses, opportunities and threats of manufacturing enterprises drawing upon the industrial developments and challenges in both cities. The review attempts to complement the literature base, and provides some references for the development of the research design for this research.

4.2 Industrial developments in Hong Kong

Hong Kong has a Chinese-majority population and a long-standing British colonial heritage. Despite a scarcity of natural resources, it initially emerged as a significant trading port but became a low-cost, export-oriented manufacturing center by the 1960s. Over the past four decades, Hong Kong has transformed its industry from labour-intensive practices to capital- and technology-based developments, and has moved from a low-cost manufacturing base to a high value-added, design- and service-oriented manufacturing centre (Berger and Lester, 1997; Enright *et al.*, 1997; HKID, 1996a; Martinsons, 1998). Based on the 1984 Sino-British Joint Declaration, the People's Republic of China (PRC) assumed political control of Hong Kong in July 1997. It has promised to maintain the existing economic, legal, and social systems until 2047 under the principle of "one country, two systems." Hong Kong became a Special Administrative Region (SAR) of the PRC.

Hong Kong started its industrial developments in the 1950s and went through its early industrialisation in the 1960s, diversification in the 1970s, industrial doldrums in the 1980s (SPI, 1989), and the gestation for new change and challenges in the 1990s and beyond (Enright *et al.*, 1997). Throughout the period, the Hong Kong economy has been driven by private capital and entrepreneurship. Hong Kong has thrived in its manufacturing base with textiles surpassed by clothing and new emerging sectors such as printing, metal goods, machinery, watches, electronic parts and appliances. For consumer goods, the reliance in the earlier years on subcontracting and sales to relatively few retailers (predominantly in the United States and Europe) were extended to the sale of branded goods to a wider customer base around the world (Sit and Wong, 1989). The capital and business acumen of communist refugees from the

Mainland China after the Second World War sparked the development of export-oriented industries (SRI, 1989). The PRC's open-door policy since 1978 has induced economic restructuring in Hong Kong. Business and financial services have replaced labour-intensive manufacturing. Moreover, support services in the financial sector, transport and telecommunications thrived. Developments in tourism also led to massive growth in the hotel and catering trades as well as in retailing (Burn, 1997). An eclectic mix of local and foreign firms now benefits from an impressive array of international business connections (Martinsons, 1998). Recent studies show that the past successes were attributable to a high responsiveness to fluctuating market opportunities, upholding the price-competitiveness and timely delivery (Berger and Lester, 1997; HKTDC, 1988; Sit and Wong, 1989).

Uncertainties about the prospects for a capitalist economy under Communist sovereignty added to long-standing concerns that Hong Kong would be squeezed between two groups of competitors, such as making use of higher level of technology and lower costs, respectively (Mak, 1992). Meanwhile, escalating business costs in Hong Kong, partly the result of shortage in skilled labour, have prompted many manufacturing firms to relocate their production facilities. The most common move has been northward into China, where both land and labour were much less expensive. Consequently, there has been a large-scale transfer of manufacturing operations from Hong Kong to the southern Chinese hinterland (particularly the Pearl River Delta region). Hong Kong's annual total outbound investment was more than thirty million US Dollar since 1998 (Martinsons, 1998). Many firms now have only a few office and sales staff in Hong Kong. Hong Kong has further leveraged its human capital, favourable locations, and natural deep-water harbour by dramatically restructuring its economies. It also aspires to be the transportation and

communications hub of the Asia-Pacific region and the financial and business service patronage (Martinsons, 1998).

4.3 Manufacturing Sectors in Hong Kong

4.3.1 Major industry sectors

Hong Kong has long had a reputation for being a producer and exporter of manufactured goods. Most output is of light manufacturing, but Hong Kong also has construction, shipbuilding and aircraft engineering industries. At present, Hong Kong exports about eighty percent of its manufactures, with its main markets being China, the United States, Germany and Japan. Although declining, manufacturing continues to be an important sector of Hong Kong's economy. Mechanisation, automation, and the relocation of labour-intensive and lower value-added manufacturing processes to Mainland China have contributed to the decline in manufacturing employment. This has facilitated Hong Kong's development of more knowledge-based and higher value-added manufacturing. Thus, manufacturing productivity (i.e. gross output per employee) significantly increased by more than 400 percent between 1983 and 1999, with a further two percent increase in 2000 (Daniel, 2001).

In terms of GDP and export values, the major manufacturing sectors of Hong Kong include the clothing (and textile) industry, the electronics industry, the plastics industry, the toy industry and the watches and clock industry. These are described as follows:

1. The clothing (and textile) industry

The clothing (and textile) industry, which has played a pivotal role in Hong Kong's development, faces challenges from continued global economic restructuring and the accession of China to the WTO, confirmed in September 2001. With all quotas being abolished by 2005, China's removal of quota restrictions will allow Hong Kong's clothing manufacturers to market their mainland-origin products freely. Therefore, the relocation of Hong Kong manufacturers to the mainland to take advantage of its lower cost base will further expand. Moreover, as compared to other manufacturing sectors in Hong Kong, the clothing industry is more diversified into the product cycle. Rather than relying heavily on OEM contracts, Hong Kong's clothing manufacturers long ago began designing their own clothing and/or developing their own wholesale and retail networks. In addition, many Hong Kong's clothing companies have invested in the creation of their own brand names. By diversifying out of the narrow segment of the product cycle involving only product assembly, Hong Kong's manufacturers are able to secure a larger portion of the clothing's value-added (HKTDC, 1998). In 1999 the clothing sector accounted for about 44% of Hong Kong's domestic exports, with its total value exceeding Hong Kong Dollar (HK$) 74,000 million, rising to HK$ 77,415 million in 2000. Re-exports were worth HK$ 99,000 million, increasing to HK$ 111,268 million in 2000. Nearly one-third of Hong Kong's total clothing exports in 1999 went to the United States market, while European Union countries accounted for one-fifth of the total (Daniel, 2001).

2. The electronics industry

The electronic industry exhibits a particular strength in the manufacture of consumer electronics (especially audio and video equipment). Hong Kong's advantage

comes from efficient low-cost manufacturing, consumer product trend identification, and aesthetic design capabilities (Berger and Lester, 1997; Enright *et al.*, 1997). Hong Kong's electronics manufacturers enjoy a reputation within the industry for being excellent organisers of the production process, manufacturing high quality goods at competitive prices. The product areas where electronics are being integrated into other goods (e.g. toys, small household appliances and watches) are ones where Hong Kong's manufacturers remain competitive (HKTDC, 1998). The cross-industry utilisation of electronics should also prove to be to the advantage of Hong Kong's electronics industry. Nevertheless, as electronic companies are moving into more technology-intensive products, the shift from low-profit-margin, mass-produced, labour-intensive products to more capital-intensive items and equipment products sharpened the competition with other Asian suppliers. Owing to the rapid expansion in Internet applications and sustained demand for telecommunication services, the market for related equipment is expected to be strong, and intensified competition from mainland suppliers will affect Hong Kong's exports to this market (HKTDC, 2000).

3. The plastics industry

Hong Kong is a major exporter of plastic products (Daniel, 2001). From its origins in the manufacture of artificial flowers, Hong Kong's present day plastics industry has become one of the most diversified and modern manufacturing sectors. The plastics industry not only produced a variety of consumer goods (e.g. plastic toys, kitchenware, office supplies and apparel), it also manufactured a large amount of intermediate goods (e.g. plastic sheeting, bags, tubes, and casings of electrical and electronic consumer goods). One of its main strengths is its diversity both in terms of the types of products made and the

number of companies in the industry. As is the case for other industries in Hong Kong, the plastics industry consists of hundreds of relatively small companies manufacturing plastics or plastic products on a somewhat restricted scale and scope. However, as a group, they form a network of plastics manufacturing that has surprising breadth and depth. Moreover, many plastics companies successfully transferred their operation management skills into southern China since the 1980s, thereby taking advantage of the lower land and labour costs on the Mainland and their comparative advantage in production management (HKTDC, 1998).

4. The toys industry

Being a major world exporter of' toys, Hong Kong produces a wide range of these products, with a particular strength in plastic toys (Daniel, 2001; HKTDC, 2000). Like many other Hong Kong industries, most Hong Kong toy manufacturers actually produce their toys in Mainland China. Those Hong Kong companies still producing toys within Hong Kong tend to be smaller companies with fewer than 50 employees. Although the shifting of manufacturing into Mainland China saves production costs of Hong Kong's toy companies, it has other implications that are detrimental to their ability to secure contracts. Most Hong Kong's toy manufacturers produce toys under OEM contracts from major overseas toy companies or retailers. According to a recent HKTDC (1998)'s estimate, some 70 percent of Hong Kong's toy output is produced under licensed or contract manufacturer for overseas buyers. When China finally becomes a member of the WTO, the terms of accession will probably further open up its domestic toy market to imported toys and foreign toy retailers. Given Hong Kong's proximity to Mainland China, its existing network of toy manufacturing facilities in Mainland China and its cultural ties to Mainland

China, Hong Kong's toy companies should have a comparative advantage in supplying Mainland children with toys (HKTDC, 1998, 2000).

5. The watches and clock industry

Hong Kong is one of the world's principal manufacturers of watches and clocks (Daniel, 2001; HKTDC, 2000). Hong Kong companies are well-known in the industry for producing good quality watches and clocks at reasonable prices and in accordance with strict production schedules. Besides, the industry is strong in sourcing parts and components for the assembly of watches and clocks. According to HKTDC (1998), Hong Kong is not as extensively involved in the production of low-end wristwatches. Nor is it competing for the market for top-end watches. The industry is comparatively specialised in the manufacture of 'middle market' wristwatches. An examination of the country of destination for Hong Kong's export reveals that the main markets include the US, Western Europe, Japan, Singapore, the United Arab Emirates (UAE) and Panama. While the first three destinations are readily understood as being major consumer markets in their own right, the later three destinations are major re-export hubs for regional markets (e.g. Singapore serves as a trading centre for Southeast Asia, whereas the UAE is a hub for the Arab states of the Middle East and Panama is a transhipment centre for Central America). Thus, Hong Kong's watches and clock manufacturers have successfully diversified their end-user market beyond the traditional focus on North America, Western Europe and Japan. Moreover, Hong Kong's manufacturers have chosen to base most of their production operations in Mainland China, but are not as yet extensively marketing their watches in Mainland China.

4.3.2 Weaknesses and threats in manufacturing

Many recent studies have described different views about the industrial developments in Hong Kong (e.g. HKID, 1996a, b; HKTDC, 1998, 2000; SPI, 1989). Key informants who display a high degree of pessimism expect the Hong Kong industries in a decade or two to lose many of its present characteristics. The competitiveness of many businesses has been eroded by such factors as escalating input costs and the uncertainties of political transition. Hong Kong's manufacturing base is shifting. For instance, there has been a tendency of Hong Kong society towards taking the easy route of migrating to China in search of lower labour costs. More than eighty percent of Hong Kong's manufacturing operations have recently migrated to China (Berger and Lester, 1997; HKTDC, 1998, 1999a). Despite still maintaining a significant contribution to the economy, the manufacturing share of both Hong Kong employment and gross domestic product has declined over the past decade (CSD, 2000; HKTDC, 1999a). The number of establishments engaged in manufacturing in Hong Kong, which had peaked at around 50,000 in 1988, had fallen to some 22,000 in 1999 (Daniel, 2001; HKTDC, 2000). Labour employed in manufacturing sectors decreased from about 900,000 its peak in the 1980s to less than 300,000 in 2001. Their gross outputs have levelled off and dropping since 1988. Moreover, improvements in the infrastructure within China also attracted many international customers and vendors by-passing offices and dealing directly with offices in China. Notwithstanding the rapid developments and growth of its service sectors, a long-term decline of manufacturing capacity in Hong Kong could weaken its competitiveness and shrink its economic growth and development (Berger and Lester, 1997; Enright *et al.*, 1997).

The most striking characteristic of Hong Kong's manufacturing enterprises is the very small size by number of employees. There are few large or professionally managed corporations, and very few enterprises apart from government and allied organisations employ more two hundred people (HKTDC, 1998). Small firms are generally operated as owner-controlled companies with close relatives employed in key positions as a direct result of family links rather than professional qualifications. Many such firms lack the resources to make a substantial technology investment, and they are reluctant to automate their activities. Since R&D inherently involves a substantial risk, many Hong Kong companies adopt a lower risk business strategy of seeking out original equipment manufacturing (OEM) contracts that allow them to quickly duplicate the latest product developments. In a typical OEM contract, the overseas buyer supplies the product design, and the Hong Kong manufacturer then produces the goods according to specifications. The OEM arrangement has two important implications for the manufacturing sectors. The lack of R&D and the tendency to produce under OEM contracts also hinders the development of Hong Kong brand names (HKTDC, 1998). Over-reliance on OEM contracts and under-investment in product design, research and development could become a barrier to Hong Kong's entry into the new multi-industry consumer products. In some ways, Hong Kong's weakness in product design and development is also heightened by a lack of engineers especially design engineers (HKTDC, 1998).

Rosenblatt and Perry (1991) argue that Hong Kong has lagged behind its key economic rivals in terms of both private sector and government funding of research and development. The resulting dependence on imported technologies was identified as a potential threat to its economic prospects. Apart from the challenge from the neighbouring

regions and countries, Hong Kong has suffered from the lack of government policy and direction of development and uncertainties about the post-1997 political stability. Unlike other little Asian dragons (such as Singapore, South Korea and Taiwan), Hong Kong does not have an explicit industrial policy and has done little to influence the supply or demand of specific technologies. The invisible hand of the market has determined largely both production and economic activities (Martinsons, 1998). Its laissez faire economic philosophy could not help many manufacturers withstand the Asian economic crisis in 1997-1998 and the recession afterward.

According to HKTDC (1998, 2000), Hong Kong manufacturers would face many substantive changes in their industry and the changes will span from the manufacturing processes to the retailing of products and delivery of services. For instance,

- Under the provisions of the Agreement on Textile and Clothing (ATC), all clothing quotas are to be phased out by 2005. The elimination of quotas will eliminate Hong Kong manufacturers' protected access to the US and European markets. Hong Kong's clothing manufacturers are at a growing disadvantage in supplying the US market when compared to clothing companies with facilities in the Caribbean, Central America or South America. Similarly, companies in Eastern Europe are challenging Hong Kong's position in supplying clothing to Western Europe. Moreover, because the incomes and working conditions of clothing industry workers and managers are less attractive than other industries, few young people are interested in a career in the clothing manufacturing industry (HKTDC, 1998).

- The electronics industry is highly cost competitive and manufacturers readily move their operations from existing locations to lower-cost sites. High mobility and lowering skill requirements makes it difficult for Hong Kong manufacturers to continue to produce in Hong Kong. Similarly, with operational costs in Southern China rising, some Hong Kong companies are moving their manufacturing facilities to new locations in Southeast Asia and elsewhere. However, as the production facilities move further and further away from Hong Kong, there is an offsetting rise in transportation and administrative costs that need not be incurred by local Southeast Asian manufacturers (HKTDC, 1998). Many Hong Kong electronics companies and their counterparts in other industries also lack experience in product development.

- Regarding the plastic industry, Hong Kong's sourcing network for obtaining polymers and resins is suspect. At present, much of the sourcing is done in Guangdong province, where quality controls are not adequate. For companies that source raw materials overseas, their procurement costs can become prohibitively high. As a result, it is often difficult for Hong Kong's plastics companies to produce products of the desired quality at a competitive price (HKTDC, 1998). Another common weakness is partially a by-product of the small size of most of the plastics companies (HKID, 1991, 1996a). Because they lack the staff and financial resources, most Hong Kong plastics companies are not very active in the design, research and development of new products or new plastics technology.

- Hong Kong's toy manufacturers rely heavily on OEM contracts, and their export performance also depends on the US markets. As Hong Kong's toy companies remain focused in basic OEM arrangements, it is increasingly difficult for them to compete with manufacturers operating on lower-cost environments (e.g. plastic toys from Taiwan and Southeast Asia). Besides, there is a threat comes from the continuing concentration of the retailing of toys (HKTDC, 1998).

- For the watches and clock industry, there is a notable lack in Hong Kong's clustering of production activities. Most of the internal workings of Hong Kong's watches and clocks are imported from the traditional centres for movements (i.e. Japan and Switzerland). The industry relies heavily on OEM arrangements and many manufacturers currently make watches that are distributed bearing foreign brand names (HKTDC, 1998). Besides, possible changes in the rules of origin will reduce the attractiveness of assembling watches and clocks in Hong Kong. Besides, Hong Kong's watches and clock industry is expecting a growing challenge in the long run from watch manufacturers in Southeast Asia and Mainland China, and new competition in the Americas and eventually Africa for the newly developing consumer markets in the Americas and Middle East (HKTDC, 1998, 2000).

4.3.3 The Hong Kong's advantages: strengths and opportunities

Hong Kong, now with about seven million inhabitants, has further leveraged its human capital, favourable locations, and natural deep-water harbour by dramatically

restructuring the economies. It is a modern metropolis with an annual per capita income level of about US $25,000, making it one of the highest in the world (Martinsons, 1998). Hong Kong aspires to be the transportation and communications hub of the Asia-Pacific region and the financial and business service patronage. Hong Kong is renowned for its unfettered capitalism and non-interventionist government. The paramount goal of the British colonial administration was to make the territory attractive for investment and trade. Without explicitly shaping industrial or commercial development, a free and fair marketplace was cultivated by 1) offering favourable personal and corporate tax rate; 2) creating and maintaining a world-class infrastructure for industry and commerce; and 3) rapidly responding to external shocks, market failures, and acute social concerns (Martinsons, 1998).

Key informants inclined towards optimism argue that Hong Kong has built one of the world's most dynamic economies on the strength of its entrepreneurship, the flexibility of its industries and the openness of its legal and regulatory environment (Berger and Lester, 1997; Enright *et al.*, 1997). Since the 1950-1960s, Hong Kong's economy has repeatedly demonstrated its ability to adapt rapidly to challenges and opportunities because of these special strengths HKTDC, 1999a, b; SPI, 1989). Hong Kong industries in a decade or two would possess the characteristics that generally conform in similar success modes of operation and become closely integrated with China. The industry has moved from the traditional small-scale operations to the modern large-scale operations that includes service elements (e.g. design, planning, production and marketing), and has been shifting towards a stage of cross-border operations. Many Hong Kong firms have expanded their scale of operations to Southern China and other neighbouring regions, while retaining their service bases in Hong Kong. The

production size of such activities increased drastically, and millions of workers are being hired in China by joint ventures and outward processing plants established by Hong Kong firms (e.g. Berger and Lester, 1997; HKID, 1996a, b; HKTDC, 1999a). The output value of Hong Kong manufacturing industry has been actually increasing, and the productivity in Hong Kong has been rising steadily. The decline in the number of manufacturing workers in the city hub is not necessarily a sign of trouble. Indeed, it may be a sign of economic strength (HKTDC, 1998).

According to the *Regional Surveys of the World: The Far East and Australiasia 2002* (Daniel, 2001), Hong Kong was the world's tenth largest trading entity in 1999. Hong Kong can be proud of the economic success that has resulted from its reliance on market forces rather than government guidance or interference. Hong Kong firms have demonstrated an ability to circumnavigate official policies and regulations and successfully do business in China. They can also expect new opportunities to synergise western technological developments with those emerging from a fast-modernising China (Martinsons, 1998). A growing emphasis on value-added services and their integration will insulate Hong Kong from the capricious global demands for manufactured goods. Hong Kong can become a design, administrative and marketing centre for a new industrial configuration in the South China economic region. This new specialisation of functions between design and high-value-added component production in Hong Kong and assembly in China can benefit both Hong Kong and China. Hong Kong can add value to products assembled in China at both the 'front end' through sourcing, marketing, design, product development and quality management, and the 'back end' through warehousing, final quality control, forwarding, shipping, and trade financing (HKTDC, 1998; SPI, 1989). These achievements contribute to the

rapid development of the service industry, especially in those services related to manufacturing in Hong Kong (Berger and Lester, 1997).

Hong Kong's unique combination of organisational demographics, managerial psychology and political environment has shaped its pattern of industrial development. Rather than concentrating on R&D or high-technology, manufacturing firms have relied on their market niches (Richards, 1993). Hong Kong firms have an enviable record of capitalising on business opportunities by acquiring and assimilating appropriate technologies and expertise on an as-needed basis. They do things fast and well rather than first or best. Moreover, according to HKTDC's (1998, 2000) studies, many Hong Kong manufacturers are 1) comparatively flexible in their production management, so adjusting their operations should pose only a minor problem; 2) have the advantage of tapping into a local industrial network of related product manufacturers. For example, if a new regulation prohibits the use of certain metals in watch bands, Hong Kong companies can more easily shift their watch band procurement arrangements than other Asian manufacturers.

The small firm size, centralised control, restricted intra-company information flows and rent-seeking tendencies inhibit the financing and organisation of leading-edge research and development (Martinsons, 1998). However, a strong spirit of enterprise, paucity of large firms, and popularity of laissez faire policies are among characteristics that distinguish Hong Kong from Singapore, South Korea and Taiwan. Facing the challenges of an increasingly competitive world economy, Hong Kong can build its past economic achievements to create comparative advantages based on its special strengths and its unique position as a truly international city standing between China and the rest of the world. The Asia Pacific region as a

whole is undergoing enormous change, and Hong Kong is in many aspects better prepared to cope with the challenges.

4.4 Industrial Developments in Shanghai

China's industrialisation originated along the coast under the early influence of the colonial powers, like the UK, France, Italy, and Germany. From the end of the 19th century mainly light industries were found in the Treaty Ports, notably in Shanghai and Tianjin (Daniel, 2001). Early in the 1940s, textiles, food processing, and a handful of other light industries in Shanghai dominated the manufacturing sector and, by way of backward linkages, supported small-scale engineering and metalworking sub-sectors. Service industries provided the bulk of employment, whether in formal activities such as banking or in informal ones such as petty retailing (Sung, 1991). After the end of the Chinese Civil War in 1949, China turned toward centralised planning and the placement of increased emphasis on heavy industry, regional self-sufficiency, and minimal reliance on foreign trade.

Shanghai was turned into mainland China's leading heavy industrial centre, satisfying China's domestic demand and providing a substantial portion of national revenue (Enright *et al.*, 1997). Like other Chinese cities, Shanghai has gone through three decades of cultural drought. Starting in 1978, reform began transferring responsibility from the centre to provinces and municipalities (Yeung and Sung, 1996; Yusuf and Wu, 1997). In the late 1980s, Shanghai embarked on a path of rapid industrial restructuring. In the 1990s, Shanghai loosened some of the inherited constraints, to begin harnessing more fully

resources both within and outside the municipal economy, and to remedy some of the inadequacies of the economy, especially in the sphere of producer services and infrastructure (Healey and Ilbery, 1990).

Shanghai was one of the 14 coastal cities and towns declared open in 1984, but its development did not take off until the opening of the Pudong area of Shanghai in the late 1980s and after the emergence of political leaders, such as Jiang Zemin, China's president, and Zhu Rongji, its vice-premier, both of whom are former mayors of Shanghai (Enright *et al.*, 1997). Shanghai has a largely industrial economy. In the 1990s, manufacturing accounted for nearly 50 per cent of output. Six main industries (including steel, autos, petrochemicals, energy, telecommunications, and computer products) accounted for some 45 per cent of gross industrial output (Enright *et al.*, 1997). Other prominent industries include machinery, shipbuilding, instruments, and polymers, whereas the main light manufacturing represents watches, cameras, radios, fountain pens, textiles, and apparel.

The opening of the Pudong area of Shanghai for investment and development signalled the return of Shanghai to the forefront of Mainland economic planning. Shanghai has been competing aggressively for the mantle of China's premier metropolis, and is now gaining the lead over other cities. Its industrial structure is shifting toward collective and private enterprises, with support from the authorities. The city has now received a substantial volume of foreign direct investment and have benefited from spillover effects emanating from neighbouring economies (Yusuf and Wu, 1997).

4.5 The Shanghai's Advantages and Challenges

Shanghai has an excellent location near the mouth of the Yangtze River, bordering the East China Sea and facing the Pacific Ocean. The city is in the centre of China's industrial heartland, the most densely populated and wealthiest portion of the Mainland, and is only a one- to two-hour flight away from Beijing, Hong Kong, Seoul, and Tokyo. Shanghai itself is home to 13 million people, the Yangtze Delta to 77 million, and the Yangtze River Basin (extending 3,000 miles up to Sichuan Province) to 360 million. Shanghai's location makes it a major port for bulk cargo such as grain, raw materials, steel, and other commodities and a major transhipment centre (Yeung and Sung, 1996). Besides, Shanghai is relatively advanced with respect to its educational system compared with the rest of the Mainland. Shanghai is the home of 52 colleges and universities. Institutions like Tongji, Fudan, and Jiaotong are among China's top universities. Shanghai ranks second to Beijing within China in terms of the number of science research institutes, technical employees, engineers, and scientists engaged in research and development (Nyaw, 1996). It also ranks second only to Beijing in terms of the proportion of professionals in the work-force. The Shanghai work-force is large and skilled by Mainland standards. Productivity is generally higher in Shanghai than elsewhere on the Mainland, despite the fact that the capital stock is typically older than that found in other areas in the nation. Wages are low by international standards (Enright *et al.*, 1997).

Shanghai is now the scene of one of the world's fastest growing metropolitan economies. Already a leading industrial centre, Shanghai is now attempting to increase its edge over China's other major cities by augmenting its technological capability in a range

of sub-sectors. By modernising its port facilities and communications infrastructure, Shanghai is restoring a source of economic dynamism that contributes directly to its industrial strength. Plans to make Shanghai the 'dragonhead' of development of the Yangtze River Basin include the development of an international financial centre, export processing, business services, and high technology industries (Fung *et al.*, 1992; Jocabs and Hong, 1994). Modern banking and other producer services began taking root in Shanghai, alongside the growth of manufacturing activities and the expansion of trade. Shanghai's many advantages are clear: an industrial tradition, a broad manufacturing base, human capital, and a strategic location (Yeung and Sung, 1996; Yusuf and Wu, 1997). Networking with industry in the region, which permits sub-contracting and shares the fruits of research and greater specialisation, can enhance growth through its influence on organization and allocation. As the technological complexity of industry increases, the development and production of new products require more team effort between specialised manufacturers, who can collectively harness the skills and research and development resources (Yusuf and Wu, 1997). Moreover, the reform of foreign investment regulations in the 1990s precipitated a dramatic rise in the number of foreign -invested companies in Shanghai. Special policies to attract investment include: special tax holidays; foreign operation of retail outlets; exemptions from duties; fewer licensing requirements; reduced regulation; circulation of foreign currency; and special provisions for repatriating earnings (Enright *et al.*, 1997).

Nevertheless, despite its recent progress and growth, Shanghai is still hindered by a national legal system that is ranked among the least transparent in Asia by International surveys (Enright *et al.*, 1997). Shanghai's industries have evolved behind protectionist

barriers that have made them inefficient on average. The city faces the heavy regulatory burden associated with a history of a planned economy and an incomplete process of economic reform. For instance, since the mid-1980s, many state-owned enterprises were urged to become independent companies, but did not take well to seeking their own customers and negotiating for their own inputs (Enright *et al.*, 1997). These state-owned enterprises and independent companies weigh down the economy, receiving massive subsidies, retaining priority access to raw materials, inputs, and skilled personnel, and influencing the competitiveness of related industries. These situations are diminishing but still interpose barriers to change (Yusuf and Wu, 1997). Moreover, in recent years, Shanghai has attracted foreign investment geared toward the domestic rather than the export market, a very different pattern from the export-oriented industrialisation of Guangdong. Export-oriented activities will only be profitable if they can meet international quality standards and prices. Import substitution and protection, on the other hand, can give rise to industries which are not competitive in international terms. Shanghai's automobile joint venture with Volkswagen, for example, produces vehicles at a cost that is twice the international price, and is only profitable because of trade barriers (Enright *et al.*, 1997).

Furthermore, the development planned for Shanghai, based on high technology industries and services, will be much more difficult to execute than that of Southern China, where relatively simple light manufacturing has been the main engine of growth (Enright *et al.*, 1997). The expertise, capital, and market know-how for the development of Southern China has come largely from Hong Kong, which is less favourably situated geographically and in terms of its own skill base to play as comprehensive a role for the type of

development planned for Shanghai. In addition, the personal freedoms and free flows of information critical for this type of development are chronically hampered in Shanghai. According to a survey of foreign investors (Nyaw, 1996), the number one reason they invested in Shanghai was access to the local market (51 out of 81 responses). The foreign investors surveyed were generally satisfied with their Shanghai partners, local employees, relations with the municipal government, and communications, but were less satisfied with the price of real estate, inflation rates, amenities for expatriate managers and their families, and availability of raw materials. They identified transportation, bogus and inferior products (intellectual property and trademark protection), corruption, and efficiency of administrative bureaux as the items that required the most immediate improvement.

China's major economic challenge in the coming years, apart from its macroeconomic problems, will be its accession to the WTO. Internal markets will undergo restructuring as provincial protectionism and trade barriers will have to be abolished or reduced. Shanghai, being one of leading cities in China, will face the increasing competition among domestic enterprises. The foreign competition will be intensified through tariff reduction and increased rivalry by foreign-invested enterprises. This will also place additional competitive pressure on its domestic producers. The main sectors affected by this increased competition will be the automobile industry, telecommunications, and financial services, whereas the main beneficiaries will be the textiles sector and machine-building (Daniel, 2001). From the government's perspective, the benefits to be found in a globally-integrated Chinese market outweigh the disadvantages that individual industries might have to suffer. Shanghai itself will continue to be both helped and hindered by its location in the heart of mainland China. It will remain the great potential market and

industrial engine of the Mainland. It remains a centre of science, technology, education, and manufacturing for the Mainland (Enright *et al.*, 1997). Facing the challenges of local and global competitions, Shanghai manufacturing enterprises must identify their core competencies, formulate strategies and measure performance for sustaining business success.

4.6 Concluding Remarks

Each city had production and cost functions that are unique in certain respects. The uniqueness derives from the geography and size of the city, the composition of industry, the use of land, and the state of infrastructure (Yusuf and Wu, 1997). Although Hong Kong and Shanghai have many differences in social, legal, economic and political profiles, they also have some common grounds for comparison. For instance, they are industrial and modern cities to varying degrees. Both have a Chinese-majority population and a distinctive geographic location within the regional context. They have large and busy ports, and are well served by their hinterlands. Each being a metropolitan economy, Hong Kong and Shanghai are potentially subject to the same economic dynamics faced by other world cities like New York, London and Tokyo. Hua (1996) argue that Hong Kong and Shanghai are two engines of China's modernisation, with the former in the south and the latter in the east of the country. Manufacturing industry has been a major contributor and a stablising force of their economy. Moreover, there has been a long tradition of economic cooperation and there exists a good technological complement between two cities. Shanghai dominates in basic research and high technology development, whereas Hong Kong's strength lies in

applied technology that contributes directly to its economic energy (Xu, 1996; Yue, 1996). The development of Shanghai shows that mainland China can and will develop more than one great economic city and that Hong Kong interests actually have the potential to benefit substantially from the process. Shanghai's development also highlights the fact that Hong Kong and its firms provide far more than just a 'gateway' and, in fact, are playing a critical role in economic development throughout the Mainland (Enright *et al.*, 1997).

Many studies have described different views about the industrial developments and modernisation in Hong Kong (e.g. Berger and Lester, 1997; Enright *et al.*, 1997; HKTDC, 1998, 2000) and Shanghai (e.g. Enright *et al.*, 1997; Fung *et al.*, 1992; Jocabs and Hong, 1994; Yeung and Sung, 1996; Yusuf and Wu, 1997). However, few researchers have specifically looked at strategy formulation and performance measurements of Chinese organisations particularly in manufacturing sectors. Most research on this issue is still based on conceptual discussions, case studies and background analysis. Comparative studies are rare among manufacturing enterprises in Hong Kong and Shanghai (Liu, 1988). The unique environments in Hong Kong and Shanghai offer this research a ground to investigate into the integration of strategy formulation and performance measurements in manufacturing enterprises. In the ensuing chapters, this thesis addresses an empirical study that was conducted to investigate the relationships among the success factors, the problems and the preferred strategy choices in manufacturing enterprises based on these two Chinese cities. The study aimed to identify the key strategy determinants and performance criteria, and analyse the capabilities of strategy formulation and performance measurements for sustaining performance improvement in manufacturing enterprises.

Chapter 5

Research Methodology:

Design and Conduct of Empirical Study

5.1 Introduction

A methodology can be defined as a coherent set of methods used in carrying out some complex activity (Zikmund, 2000). These methods provide direction and/or sets of procedures that may be followed when designing research and performing work. Silverman (1993, p.2) argues that, "methodologies, like theories, cannot be true or false, only more or less useful". This research investigates the attributes of strategy formulation (SF) and performance measurement (PM) and proposes an integrated paradigm for attaining performance improvement in manufacturing enterprises. Reviews of recent literature helps to gain insights on the concepts and practices associated with SF and PM. Collection of substantial empirical data is needed, and a two-stage empirical study is employed, addressing two problem statements. These are: 1) whether integrating strategy formulation with measurement initiatives can safeguard the performance goals in manufacturing enterprises, and 2) how practitioners can derive an integrated approach for SF and PM system implementation. This chapter explains the purposes and conduct of the empirical study, including the design of research instruments, sample selection process, and data collection and analysis.

5.2 Purposes of the Empirical Study

Many practitioners, researchers and scholars have postulated different research methodologies pertinent to study strategy formulation and performance measures in organisations (e.g. Barnes, 2001; Robson, 1993; Scudder and Hill, 1998; Yin, 1994). For instance, Robson (1993) advocated three research strategies (i.e. experiment, survey and case study), whereas Barnes (2001) suggested five methodological options (i.e. questionnaires, interviews, strategy charting, documentation, and ethnography) for empirical investigation of the process of formation of operations strategy. Yin (1994) introduced a case methodology that involves use of multiple data collection methods (such as interviews, questionnaires and documents) or multiple respondents within the organisation. According to Scudder and Hill (1998) and Barnes (2001), survey research remains popular with operations management researchers, and it seems best suited to large-scale data gathering, especially where factually based data is required, as would be the case when investigating the content of manufacturing strategy and performance measurement. However, Bowman and Ambrosini (1997) argue that surveys may be unreliable if reliant on a single respondent from one organisation.

Different research methods will have their strengths and weaknesses. In order to collect empirical data and consolidate practitioners' opinions on the two problem statements (see Section 1.2 of *Chapter One*), this study employed a two-stage methodology which combined the use of surveys and personal interviews. The methodology was used to determine empirically whether integrating strategy formulation

with measurement initiatives could safeguard the performance goals in manufacturing enterprises, via:

1) Identifying key attributes of strategy formulation and performance measures;

2) Investigating the integration of SF and PM initiatives and their relevance to sustain performance improvements in manufacturing enterprises; and

3) Developing an integrated paradigm of SF and PM for manufacturing enterprises by incorporating empirical findings.

5.3 A Two-Stage Plan of Empirical Study

The two stages of the empirical study had twelve steps. A sequential logic flow of these steps is given in figure 25. The first stage started with the literature review, and went through the design of a research instrument, the conduct of pilot tests, and surveys in two locations, followed by analysis of survey findings. Cross-referencing of actions and feedback between individual steps was made throughout the process. With the support of City University of Hong Kong and the Shanghai University, the surveys primarily addressed the identification of success factors, problematic areas and strategy choices among manufacturing enterprises in two Chinese cities, Hong Kong and Shanghai. The first-stage results contributed towards the design and conduct of subsequent interviews, and the development of an integration model for strategy formulation and performance measures. The second stage included the design of an analytical framework for interview studies, the conduct of two series of personal interviews, development

and evaluation of the integration model. It investigated primarily the causal links of SF, PM and organisational performance improvement. A breadth of views was acquired from industry practitioners, management, front-line personnel, experts, and government officials. Key strategy determinants and performance criteria were identified for assisting manufacturing enterprises in performance self-assessment and making meaningful benchmarking with competitors.

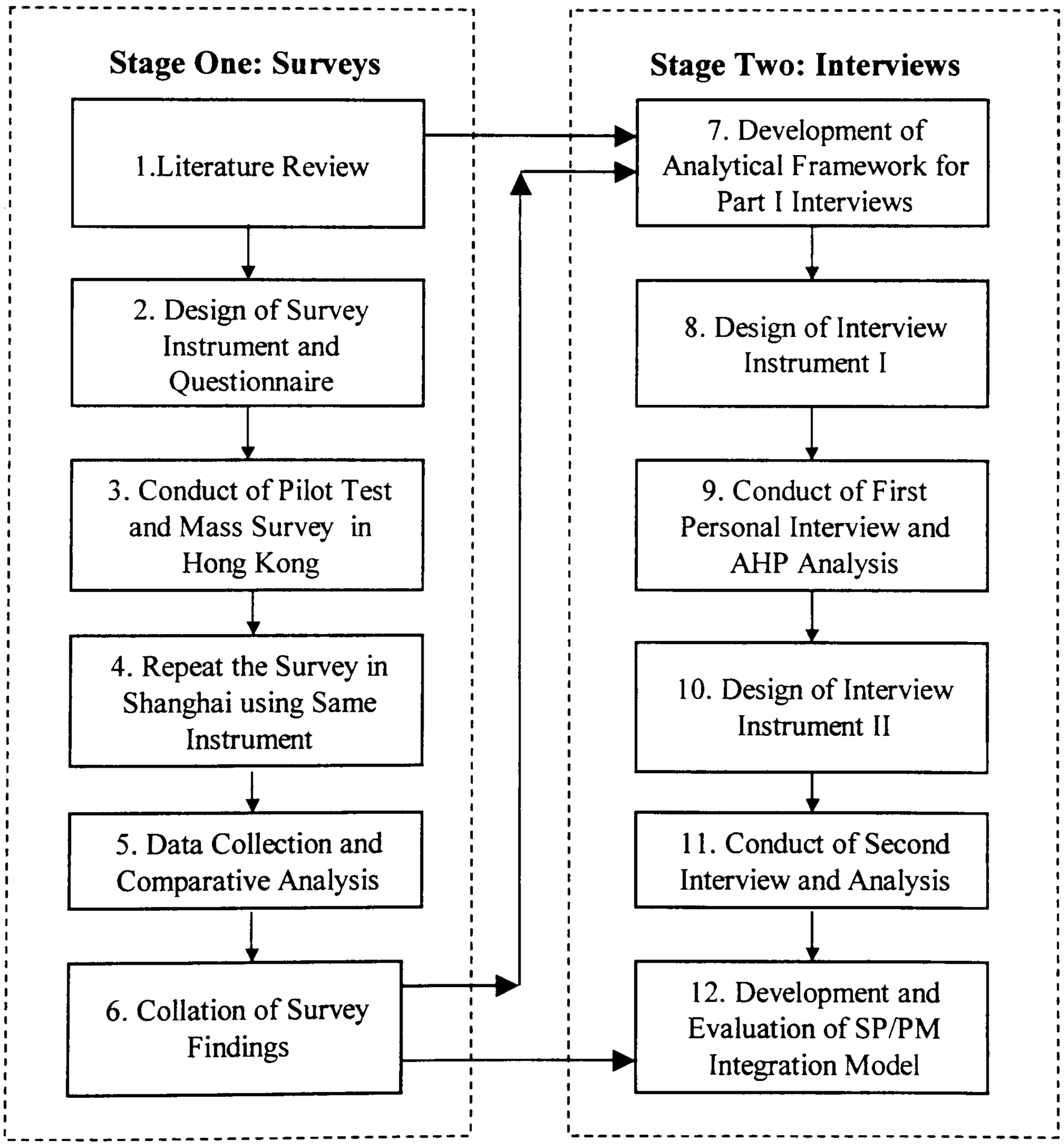

Figure 25. Conduct of a two-stage empirical study

5.4 Design and Conduct of Stage One Survey

5.4.1 Research propositions and hypotheses

Few studies have specifically looked into strategy formulation and performance measurement in manufacturing enterprises. Most research on this issue is usually based on conceptual discussions, case studies and background analysis (Liu, 1988). An attempt of comparative study was made to compare the strategy formulation practices and performance measures in manufacturing enterprises with a research base in Hong Kong and Shanghai of China. A research framework shown in figure 26 was developed, and three propositions were set for the comparative analysis.

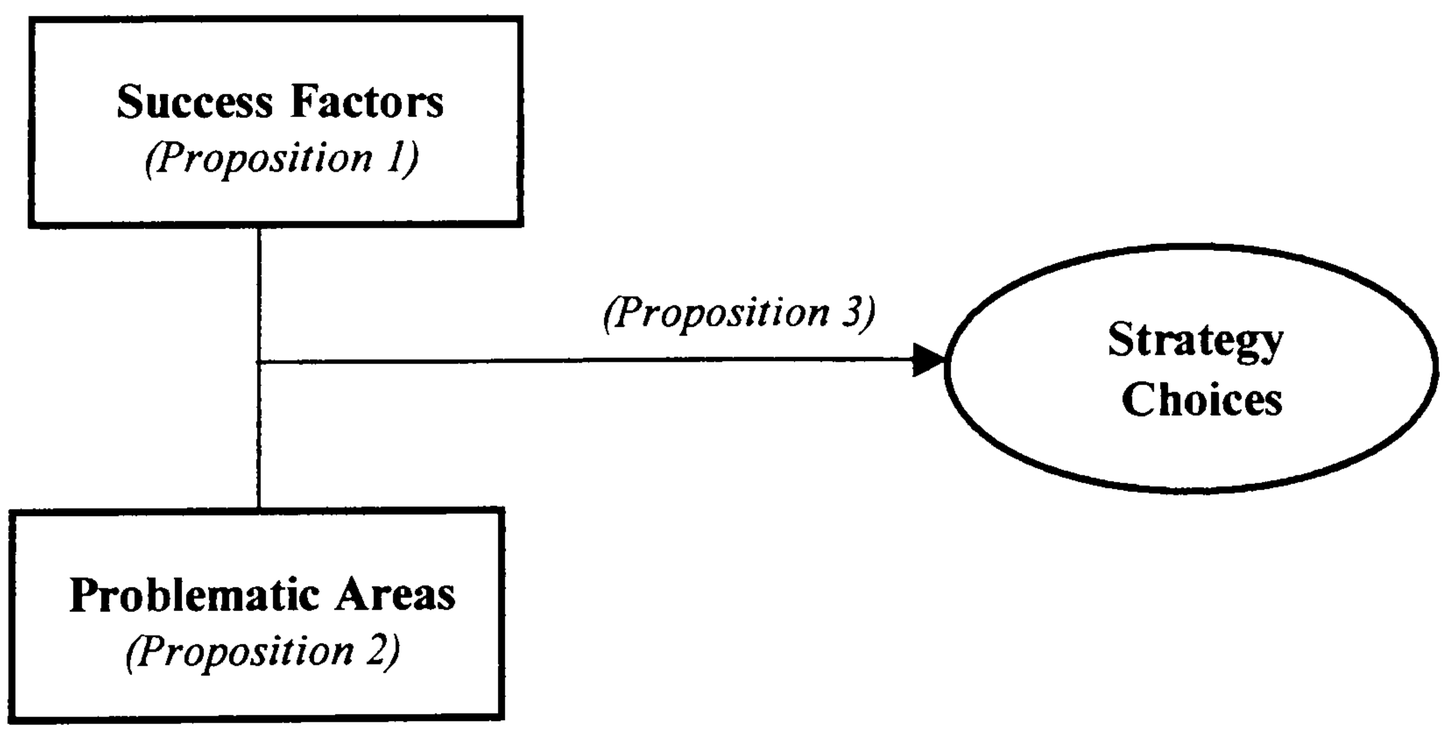

Figure 26. A research framework for comparative analysis

As discussed in *Chapter four*, Hong Kong has transformed its industry from labour-intensive practices to capital- and technology-based developments, and moved from a low-cost manufacturing base to a high value-added, design- and service-oriented manufacturing centre (Enright *et al.*, 1997). On the other hand, Shanghai has regained its fame as a promising international centre of economy, finance and trade as a result of the priority development strategy of the Chinese Government (Yusuf and Wu, 1997). Both are industrial and modern cities to varying degrees and are well served by their hinterlands. Manufacturing industry has been a major contributor and a stablising force of their economy. The manufacturing sector is dominated by a great majority of small and medium-sized enterprises (HKPC, 2000; HKTDC, 1998, 2000). Therefore, the first proposition is

- *Manufacturing firms assess their success factors with similar focus irrespective of size in Hong Kong and Shanghai.*

Both Hong Kong and Shanghai are potentially subject to the same economic dynamics faced by other world cities like New York, London and Tokyo. Recent developments in the World Trade Organisation and a multitude of other international trade agreements have forced manufacturing enterprises in both cities to face a new era of intense global competition. These enterprises have to compete effectively not only in the local context, but in wider regional and global marketplaces. Internal markets would undergo restructuring as protectionism and trade barriers would have to be abolished or reduced. Despite keen competition among domestic enterprises, foreign competition would be intensified through tariff reduction and increased rivalry by foreign-invested enterprises in both cities (Enright *et al.*, 1997; Yusuf and Wu, 1997). The second proposition is:

- *Manufacturing firms irrespective of size encounter similar business and operational problems that are common in Hong Kong and Shanghai.*

Facing the challenges of local and global competitions, manufacturing enterprises in both cities and elsewhere must identify their core competency in order to formulate viable strategies and tactics for sustaining business success. Manufacturing enterprises would select viable strategies depending significantly on the uniqueness of their competence (i.e. key success factors) and the problems encountered (Enright *et al.*, 1997; HKTDC, 1998, 2000). Therefore, the third proposition is:

- *Manufacturing firms determine strategy choices with respect to their success factors and the problems encountered.*

Many researchers have adopted a number of independent characteristics, factors, obstacles and problems to delineate the strategy formulation and development processes (see Section 2.4.1 of *Chapter two*). It was too ambitious for a research where every aspect of all possible elements can be investigated (Mills *et al.*, 1995). The author had made an attempt to compile a list of twenty common success factors and twelve problem areas for manufacturing businesses from the literature review, and used the list to conduct a longitudinal study on strategic planning practices of Hong Kong organisations during the periods of 1994-1997 (see Pun, 1998; Pun *et al.*, 2000a). Another research conducted by Chin and Pun (2000) was to investigate the strategic product development direction for Hong Kong manufacturing industries. They developed a set of twelve strategy determinants based on the author's list, and incorporated them into four categories including corporate, marketing, technology, and operations strengths of an organisation. These studies verified

the appropriateness of these identified strategy determinants with respect to the manufacturing and business environments in Hong Kong. The findings provided a good reference and comparison for any research attempting to investigate the strategy formulation practices and related areas in Hong Kong. The proposed study adopted Chin and Pun's (2000) model of four strategy determinants with modifications to examine strategy choices in manufacturing enterprises. The determinants and their key components are depicted in table 18.

Table 18. Four strategy determinants and their key components

Strategy determinants	Key components
1. Corporate Strengths	• Management commitment • Company's mission and policies • Availability of funds and capitals
2. Marketing Strengths	• Accessibility to markets • Market positioning • Company's reputation • Product and service quality
3. Technology Strengths	• R&D and innovation capabilities • Information technology and systems
4. Operational Strengths	• Company's location • Workforce skills and abilities • Costs of production/operations

Source: Based on Chin and Pun (2000)

According to Chin and Pun (2000), the corporate strengths address management commitment, company's mission and policies and availability of funds and capitals. Marketing strengths are concerned with the accessibility to markets, market positioning, and the issues of company's reputation and product/service quality. Technology strengths stress R&D and innovation capabilities (including importing technology) and the use of

information technology and systems, whereas operational strengths look into company's location, workforce skills and abilities, and costs of production or operations.

Many studies and research have recently been undertaken to investigate the proactive and reactive approaches of strategy formulation in organisations (see Sub-section 2.4.2 of *Chapter two*). This proposed study also used the 'proactive/reactive' dimension of strategy formulation to determine strategy choices. For the adoption of proactive approach, a firm attempts to explicitly allocate resources to identify and seize opportunities. On the other hand, the reactive approach relies largely on imitating the success of leading companies and their products (Chin and Pun, 2000). A list of twenty common 'proactive/reactive' strategies is given in table 19. As discussed in the Sub-section 2.4.2, many of these strategies are neutral and can be proactive or reactive in application, depending largely on the specific business and operations circumstances with which individual firms are facing. For instance, 'joint ventures' and 'product-line extension' can be reactive-oriented, while 'vertical integration' can be proactive-oriented, and *vice versa*.

Table 19. A list of proactive-reactive strategies

1. Business withdrawal or divestment	11. Product-line extension
2. Horizontal integration	12. Product modification
3. Importing technologies	13. Product/service quality improvement
4. Importing workforce	14. Production automation
5. Joint ventures	15. Related business development
6. Market development	16. Selective investments
7. Market diversification	17. Staff education and training
8. New business development	18. Strengthening R&D
9. New product development	19. Sub-contracting
10. Product diversification	20. Vertical integration

Source: Based on Pun *et al.* (2000a)

In order to investigate the links between and determine the key attributes of strategy formulation and performance measures, the research used a list of identified strategy determinants as dependent variables and the strategy choices as independent variables, respectively. The concepts embodied these variables are illustrated in figure 27, and four hypotheses are stated in the null below.

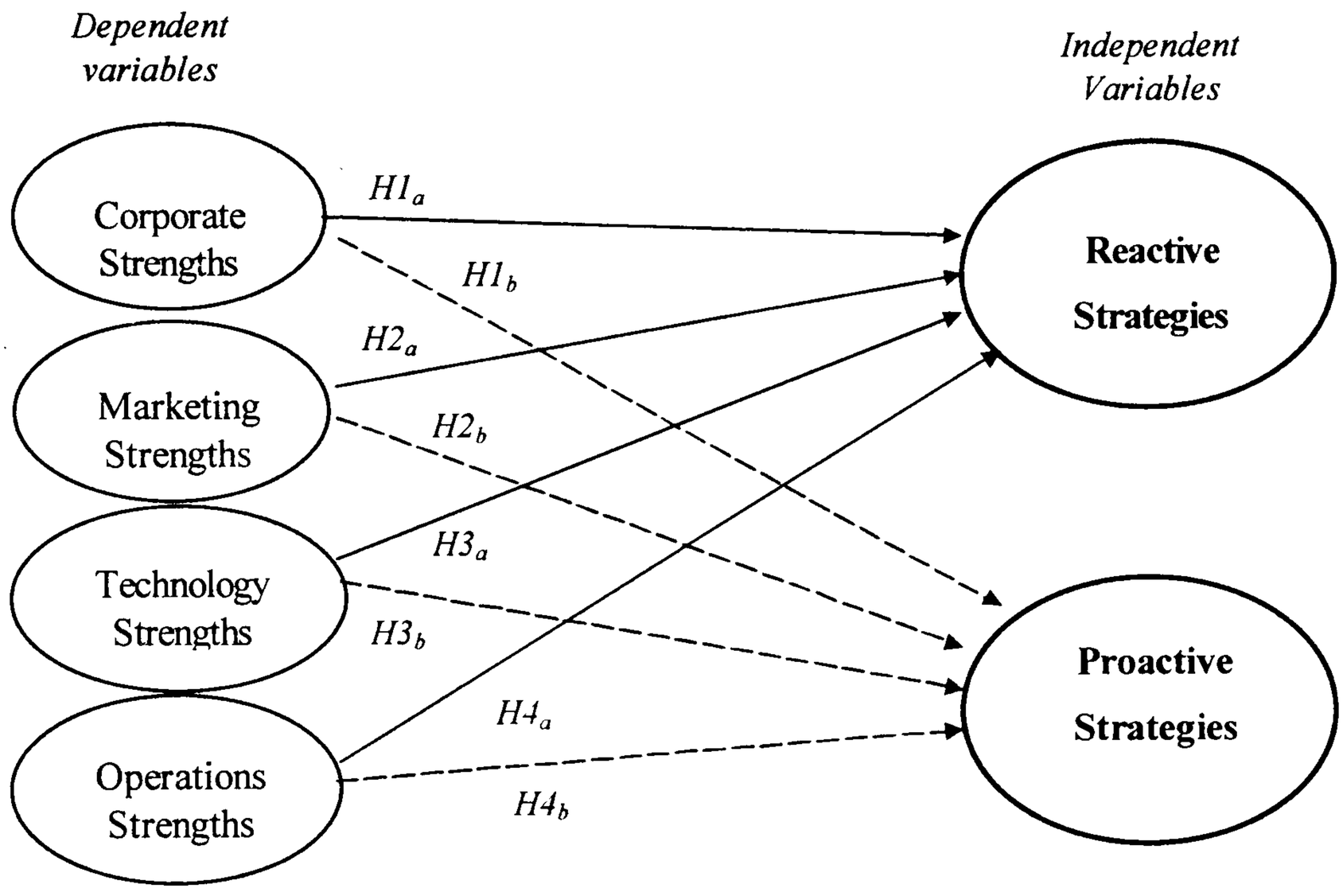

Figure 27. The hypothesised links among variables

- *Hypothesis 1: Corporate strengths will affect strategy choices of manufacturing enterprises.* It has two sub-sets of hypothesis. That is, the stronger the corporate strengths of an organisation are, the greater its intent of adopting reactive strategies (i.e. Hypothesis

$H1_a$) and proactive strategies (i.e. Hypothesis $H1_b$) will be.

- *Hypothesis 2: Marketing strengths will affect strategy choices of manufacturing enterprises.* Similarly, the hypothesis has two sub-sets regarding the adoption of reactive strategies (i.e. Hypothesis $H2_a$) and proactive strategies (i.e. Hypothesis $H2_b$). That is, the stronger the marketing strengths of an organisation are, the greater its intent of adopting these strategies will be.
- *Hypothesis 3: Technology strengths will affect strategy choices of manufacturing enterprises.* The hypothesis has also two sub-sets, including one for reactive strategies (i.e. Hypothesis $H3_a$) and the other for proactive strategies (i.e. Hypothesis $H3_b$). That is, the stronger the technology strengths of an organisation are, the greater its intent of adopting these strategies will be.
- *Hypothesis 4: Operational strengths will affect strategy choices of manufacturing enterprises.* This hypothesis proposed that the stronger the operational strengths of an organisation are, the greater its intent of adopting reactive strategies (i.e. hypothesis $H4_a$) and proactive strategies (i.e. hypothesis $H4_b$) will be.

5.4.2 Design of survey instruments

This study used a set of questionnaire as an instrument for the survey. The survey questionnaire was modified from a standard questionnaire that was developed by the author in a longitudinal study of strategic planning practice from 1994-1997 in Hong Kong (Pun, 1998; Pun *et al.*, 2000a). According to Zikmund (2000), three considerations would

determine the basic structure of a questionnaire. They are 1) the specific objectives of the questionnaire, 2) the intended respondents of the questionnaire, and 3) the method of administering the questionnaire. For the purposes of survey questionnaire design, three specific objectives were defined so as to acquire the empirical information from targeted respondents. These are:

- Company's profile and background information that was used to compare with official statistics in industry. The comparison would indicate the representation of the survey sample.
- Respondents' perception of success factors and problem areas that might have influenced strategy formulation and performance measures in their organisations.
- Respondent's comments on the strategy options of their organisations

According to Newton and Rudestam (1999) and Zikmund (2000), it is important to decide on the content, the response format and question phrasing, and to translate the question construction into one that provides useful information for subsequent analysis. A draft survey questionnaire comprising of thirteen questions was designed. Apart from the identification section, it was composed of three parts asking respondents' views on 1) the identification of success factors and the problems encountered, 2) the determination of strategy choices, and 3) the extent to which strategy determinants and components affected the manufacturing business operations of their organisations. The decisions with regard to the use of response formats would depend on the objective of particular question. Dichotomous and multiple-choice questions were used in the identification section, while the main parts of questions required the respondents to give their answers using a five-point

Likert scale. The content of each question was translated into words and phrases that could be understood by the respondents.

5.4.3 Pilot survey and questionnaire refinement

According to Yau (1994), using pilot surveys could help 1) uncover possible problem areas; 2) evaluate findings in terms of how far they achieve overall research objectives; and 3) assess the likely degree of error and the reliability and validity of the expected information. Therefore, a group of respondents were invited to assess the basic intelligibility format and comprehensiveness of the questionnaire in line with the survey objectives. These respondents were postgraduates studying in a part-time Engineering Management programme at City University of Hong Kong. Most of them held senior positions (e.g. executives, managers and engineers) in their organisations. The pilot survey was administrated in the same manner as that in the main survey. As a result, some revisions and modifications of question content were made, and the number of questions was refined from thirteen to twelve. The final version questionnaire was developed in English, and a Chinese version was produced to serve the Shanghai group of respondents. A sample questionnaire of English version is attached in Annex 1.1 of *Appendix 1.*

5.4.4 Determination of population and sample size

The major alternative sampling plans are grouped into probability techniques and

non-probability techniques (Sekaran, 1992; Zikmund, 2000). In non-probability sampling, the probability of any particular member of the population being chosen is unknown. The selection of sampling units is quite arbitrary relying on personal judgement. According to Zikmund (2000), there are no appropriate statistical techniques for measuring random sampling error from non-probability sample. Thus, projecting the data beyond the sample is statistically inappropriate. On the other hand, non-probability sampling techniques include convenience sampling, quota sampling and snowball sampling. In probability sampling, every element in the population has a known non-zero probability of selection. All probability samples are based on the chance selection procedures. This eliminates the bias inherent in the non-probability sampling. Probability sampling procedures include simple random, systematic, stratified, cluster, and multistage area sampling.

This study adopted a systematic sampling approach for the Hong Kong survey. The targeted companies were selected from the main manufacturing sectors based on the database of *the 2000 Directory of Hong Kong Industries* (DHKI). The Hong Kong Productivity Council published and updated the directory annually (HKPC, 2000). These studied sectors included electronics, textiles and clothing, watches and clocks, toys, and plastic products. The target sample also included manufacturing service organisations that provided a wide range of services in engineering support, product design, logistics, trading, and consulting. The sampling procedures started with obtaining two random integers between 0 and 9. These two elements became the starting point and the first two elements of the sample. This was followed by adding tenth to get the third and fourth elements, the fifth and sixth, and so on. A sample of 980 Hong Kong organisations was eventually obtained at a uniform interval from

the research frame of population (i.e. a targeted population of some 5,000 companies listed in the DHKI). These selected companies were then grouped according to their company sizes and types of ownership. The mean of sampling distribution generated by systematic sampling was an unbiased estimator of the population mean. Meaningful confidence intervals could be calculated as that of simple random sampling.

Regarding the Shanghai survey, a proportionate stratified sampling approach was used. The population for the survey was registered members of a university-industry collaboration network based in the Shanghai University in China. One hundred firms were chosen according to their industry sectors and types of ownership. These were composed of state-owned, private and foreign joint venture enterprises. The respondents were either senior executives or their representatives who involved in the formulation and implementation of strategies in their organisations. Taken together, the empirical data acquired could provide generalisations and applications beyond the selected samples.

5.4.5 Survey execution and analysis of findings

The empirical survey was started in early 2001, and a survey questionnaire was mailed to selected companies according to their registered business correspondences in Hong Kong. The questionnaire addressed directly to the attention of the senior responsible personnel as their names appeared in the DHKI. Reminders of questionnaire return were sent to them via mail and fax to ensure the response rate. The returned questionnaires were collected via a self-addressed envelope provided or by means of faxes. A similar

administration process was repeated in the survey conducted in Shanghai. In accordance to the reference codes assigned to individual questionnaires, the respondent companies were recorded and grouped for facilitating further analysis. Each valid reply was treated as a unit of analysis. The data and information acquired were then gone through the coding and categorising procedures. A statistical tool, the Statistical Package for Social Sciences (SPSS), was employed to analyse the acquired data and compute the survey results.

Apart from descriptive statistics, statistical tests were performed when looking at 1) the differences between Hong Kong and Shanghai respondents' views on the three propositions regarding success factors, problems and strategy choices, and 2) the hypothesised link of strategy choices with corporate strengths, marketing strengths, technology strengths and operational strengths of manufacturing firms. Correlation coefficient was used to explore potential associations between the pairs of variables (i.e. the size of companies versus success factors, problems and strategy choices). Further, a *t*-test with a 95 percent confidence interval was applied along with the Levene's Test for equality of variances to examine the hypothesised link between strategy determinants and choices. The *p*-values for both *F*-test and *t*-test were computed to give a global indication of goodness-of-fit of the hypothesised links (Newton and Rudestam, 1999; SPSS, 1997).

5.5 Design and Conduct of the Stage Two Interviews

The second stage comprised two series of interviews. The first series employed the analytic hierarchy process (AHP) methodology to investigate the decision attributes

(including criteria, sub-criteria and benefits) that affect strategy formulation and performance measures in manufacturing enterprises. The second series used the semi-structured, open-ended type of questions to solicit expansive responses and open up new lines of enquiry (Barnes 2001; Burgess, 1982) on the determination of strategy choices, performance criteria, and design of measurement systems in manufacturing enterprises.

5.5.1 Development of analytical framework

The formulation of strategies and its alignment with performance measures in organisations were considered as a typical decision problem with certain fuzziness. The problem might become more complicated as the number of decision criteria increased (e.g. Cheng and Li, 2001; Pun *et al.,* 2000c; Tummala and Wan, 1994). The AHP methodology as devised by Saaty (1986, 1994a) is used as a management tool in structuring fuzzy and complex problems. It allows the structuring of complex decision scenarios in a systematic way and to assess the possible courses of action (Saaty, 2000). Cheng and Li (2001) argue that AHP is becoming popular in research due to the fact that its utility outweighs other research methods.

As the methodological procedure of AHP can easily be incorporated into multiple, objective programming formulations with an interactive solution process, it has received a wider attention in various fields (Rangone, 1996; Razmi *et al.,* 2000; Saaty and Vargas, 1991; Tummala and Wan, 1994; Yang and Lee, 2002). For instance, Rangone (1996) developed an AHP framework for comparing the overall performance of manufacturing departments. Chin and Pun (2000) employed AHP to determine the proactive and reactive strategies for new

product development. Cheng and Li (2001) applied AHP procedure to determine measures for business performance. Yang and Lee (2002) used AHP to identify key factors for successful joint venture in China. With regards to the nature of these studies, their findings provide good references for this research to apply AHP methodology for investigating the integration initiative of strategy formulation and performance measurement in manufacturing enterprises.

AHP uses a qualitative method to decompose an unstructured problem into a systematic decision hierarchy. A hierarchy is an abstraction about the structure of the system, consisting of a several levels representing the decomposition of the overall objective to a set of clusters, sub-clusters, and then down to the final level (Harker, 1989; Saaty, 1994a,b, 2000). The clusters and sub-clusters can be objectives, criteria, attributes, activities and benefits. In the quantitative sense, the methodology attempts to accommodate both objective and subjective judgements of the evaluators in order to make trade-off and determine priorities among these clusters and sub-clusters. It employs a pair-wise comparison to execute the consistency test to validate the consistency of responses. The strength of AHP lies in its ability to mimic the management judgement about the importance that would be attached to different influential factors and to structure a complex and multi-attribute system matrix (Razmi *et al.*, 2000).

The conduct of AHP-based interviews would go through four steps, involving: 1) structuring of a decision problem, 2) measurement and data collection, 3) computation of normalised weights, and 4) determination of synthesis-finding solution to the problem (Saaty, 1994a, b, 2000). These are elaborated as follows:

Step 1: *Structuring of a decision problem*

The first step involved decomposing various decision criteria into a series of hierarchies where each level represented a set of relevant factors leading to the decision problem. This required the definition of relevant parameters, namely the final goal, the criteria, relevant environmental factors and the benefits. Based on the literature review (see Sub-section 3.4.2 of *Chapter Three* and Sub-section 2.4.1 of *Chapter Two*), a list of decision criteria, benefits and sub-elements of strategy formulation and performance measures was identified as reproduced in table 20.

By incorporating with the identified strategy determinants, the TQM philosophies and the guiding principles of Business Excellence awards (see table 17 of *Chapter Three*), the list comprises five SF/PM decision criteria, including 1) leadership and constancy of purposes, 2) results orientation, 3) management by processes, 4) people development, and 5) continuous improvement. Each decision criteria was composed of four or five sub-criteria, totalling twenty-one decision sub-criteria. Four anticipated benefits were also identified, including 1) optimisation of value-added operations, 2) improvement of efficiency and effectiveness, 3) enhancement of corporate image, and 4) strengthening of people's loyalty and morale. These criteria, benefits and sub-elements solicited the analysis of findings obtained from the first stage of empirical surveys (further explanations can be referred to Section 6.6 of the ensuing chapter).

Table 20. A list of decision criteria, benefits and sub-elements for SF/PM

Criteria and benefits	Sub-criteria and elements
1. Leadership and constancy of purposes (LC)	• Corporate mission, vision and values (COM) • Management involvement (MIN) • Management commitment (MAC) • Strategy and policy development (SPD)
2. Results orientation (RO)	• Customer focus (CUR) • Financial results (FIR) • Non-financial results (NFR) • Organisational effectiveness (OEF) • Social responsibilities (SOR)
3. Management by processes (MP)	• Product and service processes (PSP) • Sharing of information (SIN) • Sharing of knowledge (SKN) • Implementation of strategy and policy (ISP)
4. People development (PD)	• People education, training and development (ETD) • People well-being and satisfaction (PWS) • People involvement (PIN) • People empowerment (PEM)
5. Continuous improvement (CM)	• Learning culture (LEC) • Continuous innovation (COI) • Review and update of strategy/policy (RUS) • Balancing and satisfying stakeholders' needs (BSN)
6. Anticipated benefits (AB)	• Optimisation of value-added operations (OVO) • Improvement of efficiency and effectiveness (IEE) • Enhancement of corporate image (ECI) • Strengthening of people's loyalty and morale (SLM)

The problem was then structured into an analytical framework, shown in figure 28, to facilitate the personal interviews with participants or evaluators (i.e. senior executives or their representatives) from invited companies. The framework has four levels, comprising a

goal (i.e. level 0), the critical decision criteria (i.e. level 1), the sub-criteria (i.e. level 2) and the benefits (i.e. level 3). The goal was to evaluate the initiatives of integrating strategy formulation and performance measures in manufacturing enterprises. Each hierarchy level has several decision elements which were decomposed into another set of sub-elements in the next hierarchy level.

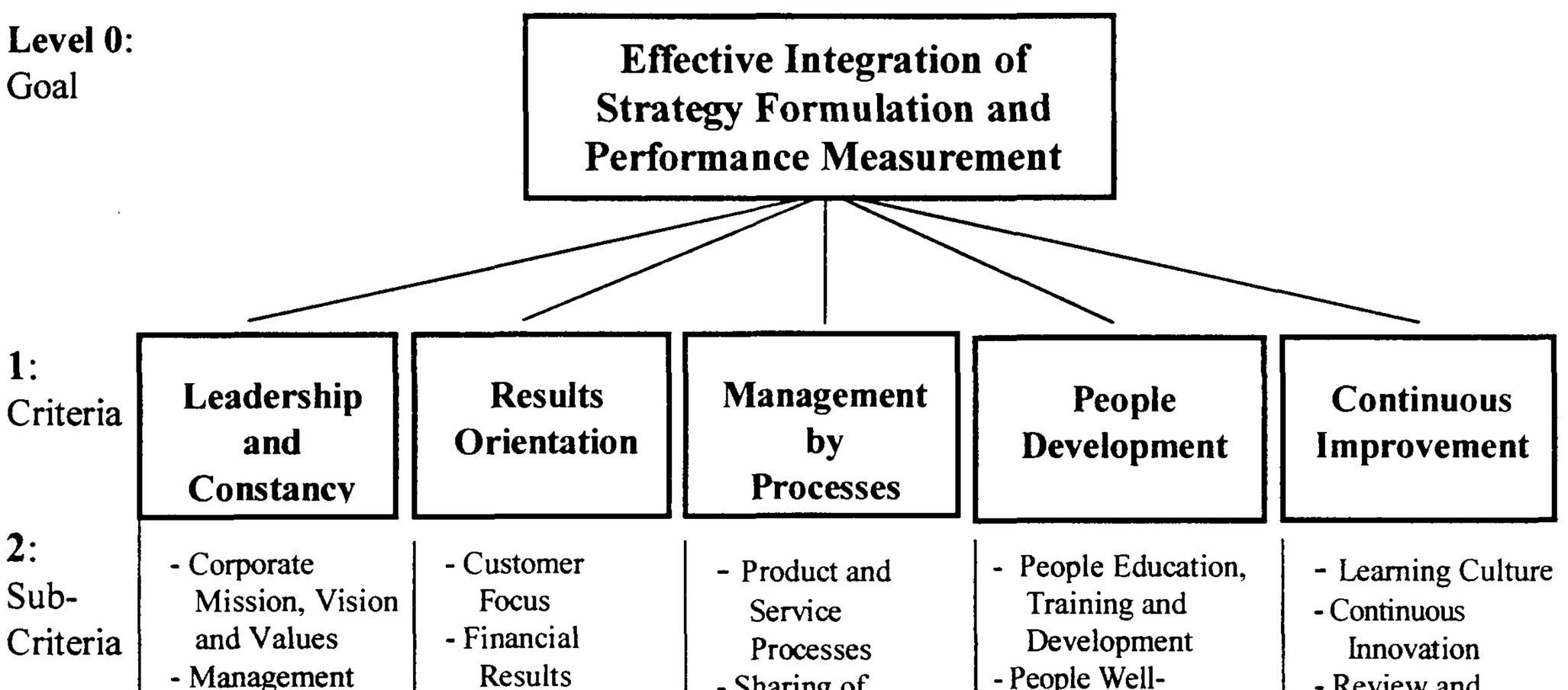

Figure 28. An analytical framework for evaluating SF and PM initiatives
Source: Own research design

Step 2: *Measurement and data collection*

This step involved the collection of data and the determination of priorities affecting the SF/PM integration in different hierarchies of the framework. Priority means the relative importance or strength of influence of a factor in relation to a factor that is place above it in the hierarchy. Invited evaluators were asked to critically examine the relative importance and priority weights of criteria by assigning relative scales in a pair-wise fashion with respect to the goal in their organisations. Figure 29 depicts a nine-point scale that was used to assign the relative scales and priority weights of criteria (Saaty, 1994a,b, 1996). Each set of comparative judgements would be entered into a separate matrix to derive the so-called 'local' priorities, i.e. the preferences with respect to a specific criterion. The weights of the criteria and sub-elements would be derived in a similar fashion. The process would continue until all comparison judgement matrices were obtained.

Intensity of Importance	**Definition**	**Explanations**
1	Equal importance	Two activities contribute equally to the objective.
3	Weak importance of one over other	Experience and judgement slightly favour one activity over another
5	Essential or strong importance	Experience and judgement favour one activity over another
7	Demonstrated importance	An activity is strongly favoured and its dominance is demonstrated in practice
9	Absolute importance	The evidence favouring one activity over another is of the highest possible order of affirmation
2, 4, 6, 8	Intermediate values between the two adjacent judgements	When compromise is needed

Note: If activity *i* has one of the above non-zero numbers assigned to it when compared with activity *j*, then *j* has the reciprocal value when compared with *i*.

Figure 29. Fundamental scale for comparative judgements
Source: Abstracted from Saaty (1994b)

Step 3: *Computation of normalised weights*

This step would compute the normalised weights of decision criteria and involve weighting the criteria, sub-criteria and benefits. The criteria would be compared in pairs to define their importance with respect to the general goal. Similarly, sub-criteria would be compared in pairs to assess their relative performance with respect to each of the criteria. The comparisons made would be based on hard data, as well as on the intuition, experience, and expertise of the evaluators. The fundamental scale presented in figure 29 was used to elicit the comparisons. The pair-wise comparison judgement matrices for criteria, sub-criteria and benefits are illustrated in tables 21, 22a-e, and 23, respectively.

Table 21. Pairwise comparison judgement matrix for Level-1 criteria*

SF/PM Criteria	LC	RO	MP	PD	CM
LC	1	3	5	7	9
RO	1/3	1	3	5	7
MP	1/5	1/3	1	3	5
PD	1/7	1/5	1/3	1	3
CM	1/9	1/7	1/5	1/3	1

*Note: LC: Leadership and Constancy; RO: Result Orientation; MP: Management by Process; PD: People Development; CM: Continuous Improvement

Table 22a. Pairwise comparison judgement matrix for LC sub-criteria*

Leadership and Constancy (LC)	COM	MIN	MAC	SPD
COM	1	3	5	7
MIN	1/3	1	3	5
MAC	1/5	1/3	1	3
SPD	1/7	1/5	1/3	1

*Note: COM: Corporate Mission, Vision and Values; MIN: Management Involvement; MAC: Management Commitment; SPD: Strategy and Policy Development

Table 22b. Pairwise comparison judgement matrix for RO sub-criteria*

Result Orientation (RO)	CUR	FIR	NFR	OEF	SOR
CUR	1	3	5	7	9
FIR	1/3	1	3	5	7
NFR	1/5	1/3	1	3	5
OEF	1/7	1/5	1/3	1	3
SOR	1/9	1/7	1/5	1/3	1

*Note: CUR: Customer Focus; FIR: Financial Results; NFR: Non-financial Results; OEF: Organisational Efficiency and Effectiveness; SOR: Social Responsibilities

Table 22c. Pairwise comparison judgement matrix for MP sub-criteria*

Management by Process (MP)	PSP	SIN	SKN	ISP
PSP	1	3	5	7
SIN	1/3	1	3	5
SKN	1/5	1/3	1	3
ISP	1/7	1/5	1/3	1

*Note: PSP: Product and Service Processes; SIN: Sharing of Information; SKN: Sharing of Knowledge; ISP: Implementation of Strategy and Policy

Table 22d. Pairwise comparison judgement matrix for PD sub-criteria*

People Development (PD)	ETD	PWS	PIN	PEM
ETD	1	3	5	7
PWS	1/3	1	3	5
PIN	1/5	1/3	1	3
PEM	1/7	1/5	1/3	1

*Note: ETD: People Education, Training and Development; PWS: People Well-being and Satisfaction; PIN: People Involvement; PEM: People Empowerment

Table 22e. Pairwise comparison judgement matrix for CI sub-criteria*

Continuous Improvement (CI)	LEC	COI	RUS	BSN
LEC	1	3	5	7
COI	1/3	1	3	5
RUS	1/5	1/3	1	3
BSN	1/7	1/5	1/3	1

*Note: LEC: Learning Culture; COI: Continuous Innovation; RUS: Review and Update of Strategy/Policy; BSN: Balancing and Satisfying Stakeholders' Needs

Table 23. Pairwise comparison judgement matrix for anticipated benefits*

Anticipated Benefits	OVO	IEE	ECI	SLM
OVO	1	3	5	7
IEE	1/3	1	3	5
ECI	1/5	1/3	1	3
SLM	1/7	1/5	1/3	1

*Note: OVO: Optimise Value-added Operations; IEE: Improving Efficiency and Effectiveness; ECI: Enhancing Corporate Image; SLM: Strengthening Loyalty and Morale

As the hierarchical levels were interrelated, a single composite vector of weights for the entire hierarchy could be obtained by computing the vectors of weights of successive hierarchies. A software package called 'Expert Choice' considerably facilitates the application of AHP (Expert Choice, 2000). With the aid of the software, the normalised and unique priority vectors of weights would be calculated for individual decision criteria and elements. The computed geometric means would then be used to combine the pair-wise comparison judgement matrices obtained from individual evaluators. For obvious reasons, the diagonal cells always contain the value '1'. If the judgments are perfectly consistent, any column of the completed matrix can simply be normalised to yield the respective 'local' priority (i.e. its relative performance) of criteria, sub-criteria or benefits. However, the judgments may not be consistent, therefore the next step consists of synthesising the local priorities to compute the global priorities throughout the hierarchy.

Step 4: *Synthesis-finding solution*

In this step, the principle of hierarchic composition would be applied for computing

the global priority weights in each hierarchy level (Saaty 1994a, b). The global composite weights were used to prioritise the criteria and sub-elements that would determine the effectiveness of integrating the SF/PM initiatives in manufacturing enterprises. The local priorities were multiplied by the corresponding criterion weight, and the results were summed up to obtain the global priority of the criterion with respect to the goal stated at the top level. The global priority weight in each level should be equal to a sum of one. If there was inconsistency, the procedure should be repeated.

Saaty (1977) suggests the eigenvector method for estimating the weights when there are errors in judgment. The eigenvector method is a simple averaging process by which the final weights are computed as the average of all possible ways of comparing the alternatives. Besides, the eigenvector method yields a natural measure for inconsistency. The consistency index (CI), random index (RI) and the consistency ratio (CR) are needed to be determined. According to Saaty (1994a,b), CR is defined as the ratio of CI to the RI; thus, CR is a measure of how a given matrix compares to a purely random matrix in terms of their CI's. Therefore CR = CI/RI. A value of the CR ≤ 0.1 is typically acceptable, but at larger values, the decision maker must reduce the inconsistency by revising judgments. A brief explanation regarding the theoretical and axiomatic foundations of AHP can be referred to *Appendix 2*.

5.5.2 Questionnaire design and pilot interviews

Using the AHP methodology, the first series of interviews attempted to acquire the

views of invited evaluators (i.e. senior executives, managers, and planners) on various decision criteria of strategy formulation and performance measures. Incorporated in the main survey findings from the first stage and literature review, a list of semi-structured questions were designed as a basis for the personal interview. The evaluators were asked to compare the relative importance among five critical criteria, twenty-one sub-criteria and four benefits that affected strategy formulation and performance measures in their organisations. The refinement of question list followed the similar procedures as that in the first stage of surveys. A pilot interview was performed and a group of ten Chinese executives (i.e. students taking a postgraduate course in Engineering Management at City University of Hong Kong) were recruited to examine the basic intelligibility format and comprehensiveness of the interview questions. Each question was collectively examined before being finalised, and a sample questionnaire is given in Annex 1.2 of *Appendix 1*.

5.5.3 Sample size and results analysis

The AHP-based interviews addressed to a targeted group of participants rather than a more conventional test of a few preconceived hypotheses in a larger number of respondents. A quota sampling method was adopted. A cluster of ten organisations was selected from each of four main categories of industry sectors, including 1) electronics and associated products, 2) textile and clothing products, 3) other manufacturing sectors, and 4) engineering services organisations. Each cluster included five large enterprises and five small and medium-sized enterprises (SMEs). In total, forty companies that have production plants and/or subsidiaries in Hong Kong and/or in Mainland China were selected. For the

purposes of this study, large companies were classified with an annual turnover or paid-up capital over HK$ 100 million (i.e. approximately US$ 15 million) and/or with more than 200 full-time employees at the time of study. The classification was based on the convention being used in various studies of similar nature in Hong Kong (e.g. see Chin and Pun (2001), Pun (1998), Yam *et al.* (2000)). The others were classified as SMEs. All selected companies should have participated in the previous stage of empirical surveys, and were either of local (i.e. Chinese) ownership or joint ownership with foreign investments.

The invited personnel were senior executives and representatives who were responsible for and had experience in strategy formulation and performance measures in their organisations. Most interviews involved personal visits; several were conducted over the telephone. During the interviews, specific and relevant terminologies of strategy formulation and performance measures were explained to participants if necessary. Care was taken to avoid the pitfall of leading questions when requesting respondents to do the pairwise comparison on a list of decision criteria, sub-criteria and elements. The length of the interviews normally ranged within 30-50 minutes. The computations and analysis of interview findings were made using the computer software, Expert Choice.

5.5.4 Design and execution of second interviews

The second series of interviews was intended to 1) clarify the ambiguity findings from the previous empirical surveys and the AHP-based interviews and 2) to further acquire practitioners' views on the top-ranked strategy choices and their relevance to

performance measures and improvements in manufacturing enterprises. The strategy determinants and performance criteria identified from the preceding interview inquiry were also probed. A set of interview questions comprising three sections was formulated. The first section was a common for all participants asking for basic information about themselves and their organisations. The second section acquired participants' intent on the prioritisation of their strategy choices and strategy formulation practice, whereas the last section verified their views on strategy determinants and performance criteria, design of measurement systems, and problems in manufacturing enterprises. A prescribed list of the questions is given in Annex 1.3 of *Appendix 1*, and an excerpt of focal questions for the interview is shown in table 24.

The interviews addressed a personal inquiry with two groups of participants, including 1) senior executives of organisations that participated in the AHP-based interviews and 2) industry experts and officials from government departments. The organisations selected for the first group were either past winners or certificates of merit holders of the Hong Kong Award for Industry (formerly, the Governor's Award for Industry, 1990-1994). This was one of the prestige awards presented by the Hong Kong Government to recognise the success of industry practitioners and their contributions to the respective industry sectors (HKTID, 2001). Therefore, those selected winners or holders were the leading organisations in their respective industries and have managed successfully their strategy formulation and performance measures to attain business growth. The second group of participants were invited on the basis of their considerable experience in strategy formulation and the use of performance measures.

Table 24. An excerpt of focal questions in the second interview

Sections	Focal areas of questions
A) General Information	1) Name of organisation 2) Name of participant 3) Position and/or job title 4) Years of service in position
B) Strategy Formulation Practices	1) Prioritisation of strategy choices in order of importance 2) Improvement of product (or service) quality 3) Identification and translation of the voices of customers into performance measures 4) Cultivation of company culture conducive to continuous improvement 5) New product development, product modification and advancement 6) Market development and expansion 7) Employment of novelty techniques, procedures and activities 8) Evaluation of product and market success 9) Setting policy for research and development 10) People training and development
C) Integration Initiatives of SF and PM	1) Influential strategy determinants and performance criteria and their sub-elements 2) Design of performance measurement systems 3) Key performance measures and/or indicators for tracking progress 4) Barriers and/or obstacles (including contextual, process, and content issues) 5) Any other factors, considerations and comments: (e.g. business environment, government policy, industry and strategy trends, and technology, etc)

The second series of interviews involved personal visits and followed similar administrative procedures as that of first series. The length of the interviews ranged within 60-90 minutes. During the interview, the process stressed a cross-fertilisation and sharing of participants' views and opinions on the integration initiatives of strategy formulation and performance measures with regards to manufacturing enterprises in different sectors. Qualitative views and opinions were consolidated and quantitative findings were tabulated for further analysis. The findings contributed to the development of an integrated paradigm for manufacturing strategy formulation and performance measures.

5.6 Concluding Remarks

The objectives of this study are to investigate the initiatives of strategy formulation and performance measures and derive an integrated approach for their implementation in manufacturing enterprises. The study addresses two problem statements: 1) can integrating strategy formulation with measurement initiatives safeguard the performance goals in manufacturing enterprises? and 2) how can manufacturing enterprises derive an integrated approach that meet their requirements and needs for SF and PM system implementation? This chapter describes the research methodology that incorporates empirical findings and evidences to help drive toward achieving the research objectives.

For the two-stage empirical study proposed, the first stage of surveys devoted to the identification of success factors, problems and strategy choices, and explored the integration of strategy formulation and performance measures and its impacts on performance improvement in manufacturing enterprises. A comparative analysis of manufacturing enterprises between two selected Chinese cities (i.e. Hong Kong and Shanghai) was initiated. In the second stage of interviews, the study devoted to the investigation into strategy choices and determinants and performance criteria for manufacturing enterprises based in the Hong Kong business environment. The first series identified the decision attributes of integrating SF and PM initiatives through interviewing a group of senior executives and representatives from surveyed organisations. The second series addressed the issues of strategy choices, determinants and performance criteria, drawing upon the success experiences of some leading manufacturing enterprises and sharing the views from industry experts and government representatives in Hong Kong.

To sum up, this chapter serves three purposes: 1) to elaborate the design of research instruments and the determination of population and sample, 2) to explain the procedures of surveys and interviews, and 3) to identify key considerations for facilitating the conduct of empirical study. This thesis will, in the ensuing chapters, present the key findings from both stages of empirical study, and elaborate the development of an integrated paradigm for manufacturing enterprises to align strategy-related measures and attain performance goals.

Chapter 6

Analysis of Empirical Findings: Stage I

- Strategy Formulation in Manufacturing Enterprises

6.1 Introduction

Many research works (e.g. see Ahmed and Montagno, 1996; Carpinetti *et al.*, 2000; CIMA, 1993; Sinclair and Zairi, 1995) have been published, emphasising the importance of a strategic management of manufacturing function and performance measures in order to gain competitive advantage. This chapter discusses the common success factors, problem areas and strategy choices of manufacturing enterprises, drawing upon an analysis of comparative survey findings in Hong Kong and Shanghai. It then examines the hypothesised links between several dependent variables (including corporate, marketing, technology and operational strengths) and independent variables (including reactive and proactive strategies) that manufacturing enterprises will be considered during their strategy formulation process. The acquisition of empirical data helps identify the strategy determinants that may influence the synergy of strategy formulation and performance measures in manufacturing enterprises.

6.2 Highlights of Empirical Surveys

Two empirical surveys were undertaken to acquire the practitioners' views on the identification of determinants of strategy formulation in manufacturing enterprises. With the support of City University of Hong Kong and the Shanghai University, one survey was completed in January 2001 in Hong Kong, whereas the other ended in March 2001 in Shanghai. The 2001 survey was considered as an extension of a longitudinal study that comprised two separate surveys that were conducted in 1994 and 1997, respectively (Pun, 1998). Both surveys investigated the changes in strategic planning practices amongst manufacturers in three largest sectors (in terms of their gross domestic products). These sectors included electronics, textile, and clothing industries. The 2001 survey combined the textile and clothing industries as one industry sector and extended the scope of the longitudinal study to include other major manufacturing sectors (such as plastics, toy, and watches and clocks industries) and a group of manufacturing services companies in Hong Kong. These services companies were providing a wide range of professional services in engineering support, product design, logistics, trading, and consulting in different industry sectors. Using a systematic sampling approach, a sample of 980 organisations was selected from the database of the *2000 Directory of Hong Kong Industries*. A postal questionnaire was used to capture the information required in the surveys (see Annex 1.1 of *Appendix 1*). The questionnaire designed was based on the one that was used in the longitudinal study, so that a direct comparison with some findings between the 2001 survey and the 1994-1997 longitudinal study could be made.

The empirical survey was repeated in Shanghai using a Chinese translation version

of the postal questionnaire and based on a targeted sample of 100 registered firms in a university-industry collaboration network. The samples were composed of state-owned, private and foreign joint venture enterprises, and the respondents were senior executives or representatives who involved in the formulation and implementation of strategies in their organisations (see Sub-section 5.3 of *Chapter Five*). Findings acquired in both cities were contrasted, and the results were compared with respect to the three propositions below.

- *Proposition 1: Manufacturing firms irrespective of size assess their success factors with similar focus.*
- *Proposition 2: Manufacturing firms irrespective of size encounter similar business and operational problems.*
- *Proposition 3: Manufacturing firms determine strategy choices with respect to their success factors and the problems encountered.*

Moreover, the survey adopted a model of four strategy determinants advocated by Chin and Pun (2000) and used the 'proactive/reactive' dimension of strategy formulation (Cardozo *et al*, 1992; Chin and Pun, 2001; Segal-Horn, 1998) to examine strategy choices in manufacturing enterprises (see Sub-section 5.4.1 of *Chapter Five*). Four hypotheses were developed. These are stated in the null below:

- *H1: Corporate strengths affect strategy choices of manufacturing enterprises.*
- *H2: Marketing strengths affect strategy choices of manufacturing enterprises.*
- *H3: Technology strengths affect strategy choices of manufacturing enterprises.*
- *H4: Operational strengths affect strategy choices of manufacturing enterprises.*

After coding the questionnaire responses, analysis was carried out using SPSS. Percentages were used throughout, with an indication of the overall total upon which these figures were based. Statistical tests were performed when looking at 1) the differences between Hong Kong and Shanghai respondents' views on the three propositions regarding success factors, problems and strategy choices; and 2) the hypothesised link of strategy choices with corporate strengths, marketing strengths, technology strengths and operational strengths of manufacturing firms. Correlation coefficient was used to explore potential associations between the pairs of variables (i.e. the size of companies versus success factors, problems and strategy choices), with *p*-values quoted to three decimal places based on the usual convention of the 5 percent and 1 percent levels (Stonehouse and Pemberton, 2002). Further, a *t*-test with a 95 percent confidence interval was applied along with the Levene's Test for equality of variances to examine the hypothesised link of strategy determinants and choices.

6.3 Findings from the Hong Kong Survey

6.3.1 Response rates and industry representation

The empirical findings of the survey in 2001 served as the basis for comparison with that of the 1994-1997 longitudinal study conducted in Hong Kong (Pun, 1998). The basic information about the sample and informants among three surveys is given in table 25.

Table 25. A comparison of basic statistics of empirical studies, 1994-2001

Respondent Profiles	**1994**[1] *(n = 33)*	**1997**[2] *(n = 45)*	**2001** *(n = 232)*
Industry Sectors			
Electronics	19 (57.6%)	27 (60.0%)	60 (25.9%)
Textile and Clothing	7 (21.2%)	18 (40.0%)	38 (16.4%)
Other Major Sectors (including toys, watches and clocks, chemical products)	7 (21.2%)	--	51 (22.0%)
Manufacturing Services	--	--	83 (35.8%)
Total in percentage:	33/151 (21.9%)	45/278 (16.2%)	232/980 (23.7%)
Years of Establishment			
Less than one year	1 (3.0%)	0 (0.0%)	0 (0.0%)
1-5 years	7 (21.2%)	6 (13.3%)	38 (16.4%)
6-10 years	16 (48.5%)	17 (37.7%)	47 (20.3%)
Over 10 years	9 (27.3%)	22 (48.9%)	147 (63.4%)
People Hired Inside Hong Kong[3]			
1-20	2 (6.1%)	4 (8.9%)	60 (25.9%)
21-50	5 (15.2%)	8 (17.8%)	66 (28.4%)
51-100	14 (42.4%)	18 (40.0%)	42 (18.1%)
101-200	6 (18.2%)	7 (15.6%)	26 (11.2%)
Over 200	6 (18.2%)	8 (17.8%)	38 (16.4%)
People Hired Outside Hong Kong[3]			
0	5 (15.2%)	4 (8.9%)	13 (5.6%)
1-20	1 (3.0%)	2 (4.4%)	12 (5.2%)
21-50	4 (12.1%)	2 (4.4%)	7 (3.0%)
51-100	13 (39.4%)	4 (8.9%)	12 (5.2%)
101-200	5 (15.2%)	8 (17.8%)	36 (15.5%)
Over 200	5 (15.2%)	25 (55.6%)	152 (65.5%)
Major Markets			
Local (Hong Kong)	6 (18.2%)	7 (15.6%)	27 (11.6%)
Mainland China	6 (18.2%)	10 (22.2%)	54 (23.3%)
Americas (North and South)	13 (39.4%)	16 (48.5%)	93 (40.1%)
Europe (Excluding Russia)	10 (30.3%)	14 (42.4%)	84 (36.2%)
Asia Pacific (Excluding Mainland)	4 (12.1%)	6 (13.3%)	39 (16.8%)
Others	2 (6.1%)	3 (6.7%)	15 (6.5%)
Single Market[4]	18 (54.5%)	20 (44.4%)	108 (46.6%)
Capital Ownership			
Local (Hong Kong)	20 (60.6%)	22 (48.9%)	139 (59.9%)
Joint Ownership: Local and China	4 (12.1%)	11 (24.4%)	36 (15.5%)
Joint Ownership: Local and Overseas	7 (21.2%)	10 (22.2%)	39 (16.8%)
Others (e.g., Foreign Capitals)	2 (6.1%)	2 (4.4%)	18 (7.8%)

Remarks:

[1, 2] *Data abstracted from Pun (1998).*

[3] *Companies employing less than 200 people are classified as small and medium-sized enterprises.*

[4] *Other Provinces, Autonomous Regions and Municipalities within Mainland China are also considered as a single market.*

Although different sample sizes were used in the three surveys, the similar target groups of respondents in Hong Kong were addressed. The comparison provides implications of generalisation regarding manufacturers' views on identification of their success factors, problems and strategy choices. Of 980 targeted manufacturing enterprises in the 2001 survey, 232 responses were obtained, yielding a response rate of 23.7 percent. The response rate in 2001 was higher compared to 21.9 percent in 1994 and 16.2 percent in 1997 from the longitudinal study. In terms of industry representation, 60 responses in 2001 were from the electronics industry (i.e. 25.9%), 38 from the textile and clothing industries (i.e. 16.4%), and 51 from other three major industries (i.e. 22.0%); whereas the rest of 83 (i.e. 35.8%) were from manufacturing services companies. Considering the longitudinal study, a majority of respondents came from the electronics sector (i.e. 57.6% in 1994 and 60.0% in 1997), and the rest were from the textile and clothing sector (i.e. 21.2% and 40.0%) and others (i.e. 21.2% and 0%), respectively.

6.3.2 Profiles of surveyed companies

The 2001 survey findings show that a majority of respondent companies (some 63.4 percent) established their business operations more than a decade (see table 25). They have experienced the Hong Kong's rapid economic growth from the late 1980s to mid 1990s and the Asian economic crisis and recession in the late 1990s. These companies were classified by size, dependent on the number of employees, as small (i.e. 50 or less), medium (i.e. 51-200) and large (i.e. 201 or more) (Pun, 1998; Stonehouse and Pemberton, 2002). It

shows that the vast majority (about 85%) were small and medium-sized enterprises (SMEs) in Hong Kong. While considering their employee population outside Hong Kong, there was a reverse scenario that about 66 percent of Hong Kong enterprises employed more than 200 people in China. It could be explained that many companies retained their design and marketing functions in Hong Kong on one hand. They relocated most of their manufacturing activities, particularly across the border to the southern China on the other. As compared with the findings of 1994 and 1997, the extent and degree of the relocation of manufacturing activities in 2001 were more intensified. There has been a large-scale transfer of manufacturing operations from Hong Kong to the Southern Chinese hinterland (particularly the Pearl River Delta region). This finding also verifies that Hong Kong has been transforming its industry from a low-cost manufacturing base to a design- and service-oriented manufacturing centre (Berger and Lester, 1997; Martinsons, 1998).

Moreover, about 40 percent of the respondents exported their products to the Americas and some 36 percent exported to Europe in 2001. The results show that some 53 percent of surveyed companies relied on a single market, and some had three to four markets. Meanwhile, the Americas (including north and south) and European countries were two dominating export markets of Hong Kong companies in the 2001 survey and the 1994-1997 surveys. Besides, the 2001 survey shows that about 60 percent of respondents were local companies, and the rest were joint venture with or owned by foreign or Chinese capital. Similar findings of firm ownerships were found in the 1994 and 1997 surveys. However, the proportions of joint ventures and/or foreign firms in 1997 (i.e. 51.1%) were about 10% greater than that in 1994 (i.e. 39.3%) and in 2001 (i.e. 40.1%).

6.3.3 *Industry rankings of success factors*

Senior management of respondent companies were asked to examine a list of twenty factors that contributed to their business success. A five-point Likert scale of rating was used ranging from 1, the least agreed, to 5, the most agreed. After calculating the mean score for each factor, all success factors were then ranked. A comparison of the survey findings between the 2001 survey and the two surveys of the longitudinal study is depicted in table 26. The most important success factors identified in the 2001 survey were product and service quality (i.e. mean = 4.35), customer services (i.e. mean = 4.18), company's reputation (i.e. mean = 4.11), and company's strategies (i.e. mean = 4.09). The standard deviations ranged from 0.59 (i.e. product and service quality) to 1.09 (i.e. company's strategies), indicating an acceptable level of data variability. A vast majority of respondents agree on good product and service quality (i.e. rank 1) and customer service (rank 2) that have determined their abilities to gain, attract and retain customers. Many respondents claimed that good company's reputation and strategies (i.e. ranks 4 and 5) could assist their organisations to compete in the marketplace. Lower cost of production or operation (i.e. rank 3), market accessibility (i.e. rank 6) and competent workforce (i.e. rank 7) were important contributors to their business success. Besides, the adoption of R&D and innovation capabilities (i.e. rank 8), management commitment (i.e. rank 9) and employee involvement (i.e. rank 10) were constituted the competitive advantage of many respondent organisations. The importance of these success factors was similar to those in the 1994 and 1997 surveys. Nevertheless, the findings show that the company's location (i.e. rank 20) was the least significant factor.

Table 26. Industry rankings of success factors in Hong Kong, 1994-2001

1994 Ranking	Mean	SD
1. Product and service quality	4.82	0.99
2. Company's reputation	4.39	0.89
3. Customer services	4.39	1.03
4. Costs of production and operations	4.33	0.96
5. Management commitment	4.12	0.84
6. Company's mission	4.09	0.84
7. Company's policies	4.06	0.84
8. Workforce skills and abilities	4.03	0.99
9. Availability of funds and capitals	4.00	1.12
10. Company's strategies	3.94	0.89
11. Information technology and systems	3.94	0.91
12. Company's location	3.82	1.01
13. R&D and Innovation capabilities	3.79	1.13
14. Availability of workforce	3.76	1.01
15. Materials supply	3.75	1.11
16. Accessibility to markets	3.67	0.97
17. Product mix and range	3.67	1.08
18. Employee involvement	3.58	1.07
19. Market position	3.59	0.93
20. Market share	3.58	0.97

1997 Ranking	Mean	SD
1. Company Reputation	4.38	0.98
2. Product and service quality	4.31	0.80
3. Customer services	4.04	1.01
4. Accessibility to markets	3.89	0.92
5. Workforce skills and abilities	3.87	0.92
6. Company's strategies	3.80	0.94
7. Company's mission	3.73	0.90
8. Company's policies	3.73	1.06
9. Information technology and systems	3.69	0.88
10. Management commitment	3.69	0.90
11. Availability of funds and capitals	3.67	0.92
12. Materials supply	3.67	0.93
13. Employee involvement	3.67	0.82
14. Market position	3.53	0.91
15. Company's location	3.49	1.13
16. R&D and Innovation capabilities	3.33	0.94
17. Availability of workforce	3.33	1.04
18. Costs of production and operations	3.24	0.88
19. Product mix and range	3.18	0.92
20. Market share	3.16	0.94

2001 Ranking	Mean	SD
1. Product/service quality	4.35	0.59
2. Customer services	4.18	0.75
3. Costs of production and operations	4.13	0.76
4. Company's reputation	4.11	0.93
5. Company's strategies	4.09	1.09
6. Accessibility to markets	4.07	0.82
7. Workforce skills and abilities	4.00	0.88
8. R&D and Innovation capabilities	3.94	0.92
9. Management commitment	3.93	0.98
10. Employee involvement	3.90	0.88
11. Market positioning	3.87	0.89
12. Company's policies	3.84	0.84
13. Market share	3.84	0.88
14. Availability of funds and capitals	3.80	0.86
15. Materials supply	3.78	0.94
16. Company's mission	3.75	0.78
17. Product mix and range	3.74	0.86
18. Availability of workforce	3.72	0.92
19. Information technology and systems	3.67	0.88
20. Company's location	3.40	0.98

Keys: Mean (based on 1 = the least agreed, and 5 = the most agreed); SD = Standard deviation; →shows the change in ranking

With an exception that the costs of production and operations dropped from 4th place (i.e. mean = 4.33) in 1994 to 18th place (i.e. mean = 3.24) in 1997 and then lifted up dramatically to 3rd place (i.e. mean = 4.13) in 2001 (see Table 26). This tremendous change was attributable to manufacturers' better control of production/operation costs that helped safeguard their profit margin after the post-1997 economic recession. Furthermore, because of varied business nature, manufacturing enterprises have different views towards the importance of success factors in individual industry sectors as shown in table 27.

Table 27. Common success factors among industry sectors in Hong Kong

2001 Rank	**Electronics** *(Mean)*	**Textile and Clothing** *(Mean)*	**Other Major Sectors** *(Mean)*	**Manufacturing Services** *(Mean)*	**Industry Norm** *(Mean)* *
1.	Product and service quality *(4.38)*	Company's reputation *(4.42)*	Product and service quality *(4.30)*	Product and service quality *(4.14)*	Product and service quality *(4.35)*
2.	Company's strategies *(4.21)*	Customer services *(4.29)*	Customer services *(4.29)*	Customer services *(4.08)*	Customer services *(4.18)*
3.	Accessibility to markets *(4.14)*	Product and service quality *(4.27)*	Company's strategies *(4.04)*	Company's strategies *(4.05)*	Costs of production and operations *(4.13)*
4.	Costs of production and operations *(4.09)*	Costs of production and operations *(4.22)*	Company's reputation *(4.01)*	Company's reputation *(4.05)*	Company's reputation *(4.11)*
5.	Customer services *(4.09)*	Workforce skills and abilities *(4.19)*	Costs of production and operations *(3.95)*	Workforce skills and abilities *(3.97)*	Company's strategies *(4.09)*

**Remarks*: The mean values of industry norm are abstracted from Table 26.

The survey findings show that product and service quality, customer service, and

costs of production and operations commanded greatest common concerns amongst manufacturers and manufacturing service companies in different industry sectors. However, in recent years, many electronic companies in Hong Kong have been moving strategically into more technology-intensive products. The shift from low-profit-margin, mass-produced, labour-intensive products to more capital items and equipment products has sharpened the competition with other Asian suppliers. Because an intensified competition from mainland suppliers would affect Hong Kong's exports, the accessibility to markets was increasingly important. Therefore, many electronics companies considered deliberately the impact of company's strategies (i.e. mean = 4.21) and the accessibility to markets (i.e. mean = 4.14) as their success factors.

In textile and clothing firms, as shown in Table 27, most respondents stressed company's reputation (i.e. mean = 4.42) and workforce skills and abilities (i.e. mean = 4.19). Rather than relying heavily on OEM contracts, many Hong Kong's textile and clothing firms have designed their own products and/or developed their own wholesale and retail networks. Many already invested in the creation of their own brand names (HKTDC, 1998, 2000). In expanding their business in global market places, reputation could help Hong Kong companies secure their competitive advantage. Moreover, with all clothing quotas are to be phased out by 2005, China's removal of quota restrictions allows Hong Kong's manufacturers to market their mainland-origin products freely. Therefore, the relocation of Hong Kong manufacturers to the mainland to take advantage of its lower cost base will expand. Further, securing skilful workforce has contributed to the expansion of their production capacities in the mainland and overseas.

In addition to attaining good product and service quality, customer services and lowering the costs of production and operations, both manufacturing services and other major sectors stressed company's strategies and reputation with a mean of 4.01 and 4.05, respectively (see Table 27). Many manufacturing service companies has relied significantly on their reputation and strategies to retain existing clients and attract new business opportunities particularly in the booming markets in the Mainland. Besides, the relocation of costly operations has become a dominant strategy of manufacturing services companies and the plastics and toys manufacturers. The lower-cost production environment in southern China and its proximity to Hong Kong has provided a strong incentive for Hong Kong manufacturers to relocate their operations across the border. For instance, many plastics companies successfully transferred their operation management skills into southern China. Many Hong Kong's watches and clock manufacturers have chosen to base most of their production operations in Mainland China, and have successfully diversified their end-user market beyond the traditional focus on North America, Western Europe and Japan. Besides, many Hong Kong's toy manufacturers produced toys under OEM (original equipment manufacturing) contracts from major overseas toy companies or retailers, and also have a comparative advantage in supplying Mainland children with toys.

6.3.4 Industry rankings of problem areas

The respondents were asked to examine a list of twelve problems that might have been encountered in their companies. A five-point Likert scale of rating was used ranging

from 1, the least agreed, to 5, the most agreed. Table 28 depicts the rankings of these problems among the respondents in the 2001 survey as compared that of the 1994-1997 longitudinal study. Many respondents in the 2001 survey ranked keen local competition (i.e. mean = 3.85) and increasing production costs (i.e. mean = 3.77) as the prioritised problems, followed by strong overseas competitors (i.e. mean = 3.75), insufficient R&D (i.e. mean = 3.60), and few current and/or potential markets (i.e. mean = 3.23). A range of standard deviations from 0.69 (i.e. increasing production costs) to 1.20 (i.e. few current and potential markets) was recorded.

The results show that facing keen local competition (i.e. mean = 3.85; SD = 0.71) became the most important problem for most manufacturing enterprises. More local and foreign companies established their business and operational base in China, leading to keen competition. For instance, many respondents were expecting a growing challenge in the long turn from overseas competitors (i.e. mean = 3.75; SD = 0.93) in Southeast Asia, and new competition in the Americas and Middle East. Escalating business and operational costs in Hong Kong (i.e. mean = 3.77; SD = 0.69), partly the result of shortage in skilled labour, have prompted many manufacturing firms to relocate their production facilities. Many Hong Kong manufacturers (in particular, textile and clothing firms, and electronics firms) have been moving their manufacturing facilities to southern China and new locations in Southeast Asia and elsewhere. However, as the production facilities moving further away from Hong Kong, there would have an offsetting rise in transportation and administrative costs.

Table 28. Industry ranking of problem areas in Hong Kong, 1994-2001

1994 Rankings	Mean	SD
1. Few current and potential markets	3.76	0.91
2. Increasing production costs	3.67	0.96
3. Insufficient research and development	3.48	1.03
4. Strong overseas competitors	3.42	0.97
5. Low productivity	3.39	1.08
6. Keen local competition	3.24	1.14
7. Cash flow problems	3.24	1.04
8. Few suppliers and/or vendors	3.15	1.06
9. High employee turnover	3.15	1.06
10. Lack of government support	3.06	1.06
11. Effects of protectionism	3.03	1.07
12. Political influence	2.76	0.84

1997 Rankings	Mean	SD
1. Few suppliers and/or vendors	3.78	0.84
2. Low productivity	3.73	1.01
3. Few current and potential markets	3.73	0.97
4. Increasing production costs	3.67	0.98
5. Strong overseas competitors	3.56	0.98
6. Lack of government support	3.47	1.05
7. Keen local competition	3.38	1.03
8. Insufficient research and development	3.36	1.04
9. Cash flow problems	3.16	0.96
10. High employee turnover	3.07	1.07
11. Effects of protectionism	3.07	0.95
12. Political influence	2.98	0.88

2001 Rankings	Mean	SD
1. Keen local competition	3.85	0.71
2. Increasing production costs	3.77	0.69
3. Strong overseas competitors	3.75	0.93
4. Insufficient research and development	3.60	0.98
5. Few current and potential markets	3.23	1.20
6. Lack of government support	3.23	1.03
7. High employee turnover	3.18	0.82
8. Cash flow problems	3.04	0.88
9. Effects of protectionism	2.99	0.92
10. Few suppliers and/or vendors	2.93	0.96
11. Low productivity	2.92	0.71
12. Political influence	2.57	0.79

Keys: Mean (based on 1 = the least significance, and 5 = the most significance); SD = Standard deviation; → shows the change in ranking

As shown in table 26, about 84 percent of respondents in the 2001 survey were SMEs. Most of these firms lacked the resources to make a substantial technology investment in R&D (i.e. mean = 3.60; SD = 0.98). As a matter of fact that many Hong Kong companies have adopted a lower risk business strategy of seeking out OEM (original equipment manufacture) contracts. The lack of R&D and the tendency to produce under OEM contracts have hindered the development of Hong Kong brand names (HKTDC, 1998). Because many Hong Kong manufacturers focused in basic OEM arrangements, it was increasingly difficult for them to compete with manufacturers operating on lower-cost environments (e.g. Southeast Asia). The weakness of Hong Kong's manufacturers in product design and development was also heightened by a lack of engineers, especially design engineers, and this was closely related to the problems of high employee turnover.

Facing the increasing local, regional and global competitions, there has been a threat of shrinking current and potential markets (i.e. mean = 3.23; SD = 1.06). Hong Kong manufacturers were facing many changes in their industry that spanned from the manufacturing processes to the retailing of products and delivery of services. For instance, a threat has come from the continuing concentration of the US clothing market and the retailing of toys. Despite the challenge from the neighbouring regions and countries, Hong Kong has suffered from the lack of government policy and direction of development and uncertainties about the post-1997 political stability of Hong Kong. As a result, many respondents argued that lack of government support (i.e. mean = 3.23; SD = 1.03) would adversely affect their business operation and production. Furthermore, high employee turnover (i.e. mean = 3.18; SD = 0.82) would bring serious problems in many manufacturing companies particularly in plastic, toy and clothing industries. Because of lower incomes and poor working conditions

compared with that of many other non-manufacturing sectors (e.g. servicing, finance, banking), few young people and graduates would be interested in a career in manufacturing sectors, which for their part found it difficult to compete on technical superiority.

Meanwhile, few suppliers/vendors and low productivity were the most important problem areas in 1997 with a mean of 3.78 and 3.73, respectively, but were regarded as the least influential problem areas in the 2001 survey. This was attributable to the fact that Hong Kong has experienced a fast economic growth from early to mid-1990s, searching reliable suppliers or vendors and improving productivity has became a competitive priority to meet the increasing business needs during that time. However, the business scenario changed dramatically during the economic turmoil in 1997-1998, fierce competitions and increasing production costs have forced a lot of low-performing firms out of business. As a result, the importance of reliable suppliers/vendors and poor productivity has become lower than with other parameters (like keen local competition, increasing production costs, strong overseas competitors, and insufficient R&D) for safeguarding firms' survival and growth.

In summary, despite some variations in their rankings of importance, those identifiable problems were common in various manufacturing sectors including manufacturing service companies (see table 29). These included keen local competition, strong overseas competitors, increasing production costs, insufficient R&D, and few current and potential markets. Nevertheless, in addition to these, many textile and clothing firms also considered seriously the lack of government support (i.e. mean = 3.44), while other manufacturing sectors have substantive worries on high employee turnover (i.e. mean = 3.42).

Table 29. Common problems among industry sectors in Hong Kong

2001 Rank	Electronics *(Mean)*	Textile and Clothing *(Mean)*	Other Major Sectors *(Mean)*	Manufacturing Services *(Mean)*	Industry Norm *(Mean)* *
1.	Keen local competition *(3.85)*	Few current and potential markets *(4.03)*	Few current and potential markets *(3.80)*	Keen local competition *(3.87)*	Keen local competition *(3.85)*
2.	Strong overseas competitors *(3.73)*	Increasing production costs *(3.88)*	Increasing production costs *(3.79)*	Increasing production costs *(3.77)*	Increasing production costs *(3.77)*
3.	Increasing production costs *(3.70)*	Keen local competition *(3.78)*	Strong overseas competitors *(3.78)*	Insufficient research and development *(3.67)*	Strong overseas competitors *(3.75)*
4.	Insufficient research and development *(3.67)*	Strong overseas competitors *(3.69)*	Keen local competition *(3.70)*	Strong overseas competitors *(3.58)*	Insufficient research and development *(3.60)*
5.	Few current and potential markets *(3.26)*	Lack of government support *(3.44)*	High employee turnover *(3.42)*	Few current and potential markets *(3.18)*	Few current and potential markets *(3.23)*

**Remarks*: The mean values of industry norm are abstracted from table 28.

6.3.5 Industry rankings of strategy choices

The respondents were then asked to consider a list of twenty manufacturing strategy choices with respect to their success factors and problem areas, using a five-point Likert scale from 1, the least agreed, to 5, the most agreed. Table 30 shows that the product/service quality improvement (i.e. mean = 4.35), new product development (i.e. mean = 4.12), market development (i.e. mean = 4.10), product modification (i.e. mean = 4.07), and importing technologies (i.e. mean = 4.02) were the five most preferred choices in the 2001 survey. The standard deviations in strategy choice scores obtained ranged from 0.74 (i.e. product/service quality improvement) to 1.19 (i.e. strengthening R&D).

Although the 1994-1997 longitudinal study used 'Yes/No' answers, it permitted a meaningful comparison of main findings of respondents' agreement on given list of manufacturing strategy choices. The results show that the 2001 rankings were similar to that in 1997 with exceptions that production automation dropped from 2nd place to 11th place and staff education and training moved up from 12th to 6th place in 2001. Production automation has greatly lessened the problem of low productivity, and was therefore ranked second strategy in 1997 (it was 11th in 1994). The rapid economic growth during the 1994-1997 period offered many business opportunities for manufacturers to diversify their markets. Market diversification rose from 18th place in 1994 to become one of the common strategy choices in 1997.

Entering the new millennium, the adoption of automation practices has become a basic requirement rather than been considered as a significant manufacturing strategy for improving productivity. Market diversification maintained its importance in 7th place (i.e. mean = 3.88; SD = 0.88) amongst the preferred options of strategies in 2001. Meanwhile, staff education and training (i.e. mean = 3.94; SD = 0.76) was stressed as it helped organisations to implement their strategies. Many respondents also considered strategy options like sub-contracting (i.e. mean = 3.88; SD = 0.86), strengthening research and development (i.e. mean = 3.77; SD = 0.87), and product diversification (i.e. mean = 3.73; SD = 0.76). Nevertheless, business withdrawals or divestment, importing labours and joint ventures were the least preferred strategies that commanded the minor attentions in the 2001 survey (and 1997 survey as well), whereas business withdrawals or divestment was the least preferred strategy in 1994.

Table 30. Industry ranking of strategy choices in Hong Kong, 1994-2001

1994 Ranking	Agree %	SD
1. Product and service quality improvement	100	--
2. Market development	100	--
3. New product development	100	--
4. Importing technologies	100	--
5. Staff education and training	93.9	--
6. Product modification	87.9	--
7. Product diversification	84.8	--
8. Selective investments	84.8	--
9. Strengthening research and development	81.8	--
10. New business development	81.8	--
11. Production automation	75.8	--
12. Product line extension	75.8	--
13. Sub-contracting	69.7	--
14. Joint ventures	63.6	--
15. Horizontal integration	60.6	--
16. Vertical integration	54.5	--
17. Importing workforce	54.5	--
18. Market diversification	51.5	--
19. Related Business development	36.4	--
20. Business withdrawal and/or divestment	9.1	--

1997 Ranking	Votes %	SD
1. Product and service quality improvement	100	--
2. Production automation	95.6	--
3. Market development	95.6	--
4. New product development	93.3	--
5. Market diversification	88.9	--
6. Product modification	84.4	--
7. Sub-contracting	80.0	--
8. Strengthening research and development	75.6	--
9. Importing technologies	73.3	--
10. Horizontal integration	71.1	--
11. Product line extension	71.1	--
12. Staff education and training	62.2	--
13. Product diversification	60.0	--
14. Related Business development	57.8	--
15. New business development	51.1	--
16. Vertical integration	33.3	--
17. Selective investments	22.2	--
18. Joint ventures	20.0	--
19. Importing workforce	2.2	--
20. Business withdrawal and/or divestment	0.0	--

2001 Ranking	Mean	SD
1. Product and service quality improvement	4.35	0.74
2. New product development	4.12	0.81
3. Market development	4.10	0.73
4. Product modification	4.07	0.77
5. Importing technologies	4.02	0.88
6. Staff education and training	3.94	0.76
7. Market diversification	3.88	0.88
8. Sub-contracting	3.88	0.86
9. Strengthening research and development	3.77	1.19
10. Product diversification	3.73	0.76
11. Production automation	3.70	0.95
12. Related Business development	3.63	0.96
13. Product line extension	3.56	0.94
14. Vertical integration	3.48	0.92
15. New business development	3.19	1.09
16. Horizontal integration	3.16	1.06
17. Selective investments	3.13	0.93
18. Business withdrawal and/or divestment	3.01	1.01
19. Joint ventures	2.98	0.98
20. Importing workforce	2.65	0.85

Keys: Agree % = Percentage of agreement; Mean (based on 1 = the least agreed, and 5 = the most agreed); SD = Standard deviation; →shows the change in ranking

Hong Kong manufacturers have developed the agility to move from low end to higher end, from product to product, and even from one light consumer goods sector to another. According to Enright *et al.* (1997), a 'hustle' type of strategies combined speed and flexibility with reliable quality, delivery, and competitive pricing, has been most readily seen amongst Hong Kong's electronics, watches, clothing, and toys manufacturers (Enright *et al.*, 1997). In the electronics sector, for example, Hong Kong manufacturers started producing calculators, walkie-talkies and radios in the 1970s, telephones in the 1980s, and, in recent years, cordless telephones, video telephones, computers and related products, and printed circuit boards. The watch manufacturers have used their trader's acumen to recognise and exploit consumer demand in the international watch market, and now produce thousands of styles of watches that are keenly focused on changing consumer tastes. Evidence shows that Hong Kong manufacturers emphasised flexibility to respond at high speed to new and emerging trends, and aimed to beat competitors to the market by recognising new trends more quickly, and capturing a high margin of profit by being first to respond, but then moving on quickly in response to new developments. Such hustle strategies are a combination of product/service quality improvement, new product development, product modification, market development and diversification, and sub-contracting. These are also complemented with importing technologies and staff education and training.

Hong Kong manufacturers who rely on a hustle strategy tended to invest relatively little in long-term planning, tie down comparatively little capital in technologies, and do not spend much on R&D. Although many respondents have a high expectation towards strengthening R&D (i.e. rank 9) and considered it as one of preferred strategies in the 2001

survey, possible explanations might be attributable to the dilemma of 'what manufacturers were supposed to do' rather than 'actually did'. Although being the low investors in brands, many Hong Kong firms have demonstrated an enviable capability to seize business opportunities quickly by acquiring much of the technology and expertise on an as-needed basis. Besides, Hong Kong firms have shown a high degree of fluidity in combining light manufacturing with trading activities. The strong overlap of skills and abilities across the sectors promotes this fluidity, while the constant movement of entrepreneurs from one segment to another reinforces the skills base and influences manufacturing strategies. Therefore, both 'importing technologies' and 'staff education and training' were two preferred strategies ranked as 5 and 6 respectively, in the 2001 survey.

Many respondents preferred using subcontracting to move from product to product and sector to sector (i.e. rank 8 in the survey). For instance, in watches and toys sectors, Hong Kong companies have been structuring complex subcontracting relationships to facilitate rapid and flexible manufacturing. Similarly, the flexibility of textile and clothing firms in responding speedily to fast-changing, fashion-driven demand have been enhanced by the presence of a very large number of small and medium-sized factories organised into efficient subcontracting networks. Some Hong Kong manufacturers were signing agreements with established Chinese clothing companies to access their partners' retail network. Some were focusing more on securing the rights to popular brand names and clothing labels in Mainland China to improve their sales potential with mainland consumers. This implies that many respondents stressed the importance of market diversification (i.e. rank 7) and product diversification (i.e. rank 10).

Furthermore, business nature and type have a direct influence on strategy choices. Table 31 shows the industry norm of preferred strategy choices in different manufacturing sectors in the 2001 survey. Despite agreeing on product and service quality improvement as the most preferred strategy option, respondents have some variations of their strategy choices in individual sectors. For instance, the textile and clothing firms realised the benefits from staff education and training (i.e. mean = 4.26). Similarly, the manufacturing services sector stressed staff education and training (i.e. mean = 4.08) and related business development (i.e. mean = 3.97). Other major sectors (e.g. toys, and watches) included market diversification (i.e. mean = 3.95) as one of their preferred strategies. These findings provided empirical evidence for this investigation into preferred strategy choices for attaining sustainable performance in manufacturing sectors.

Table 31. Preferred strategy choices among industry sectors in Hong Kong

2001 Rank	**Electronics** *(Mean)*	**Textile and Clothing** *(Mean)*	**Other Major Sectors** *(Mean)*	**Manufacturing Services** *(Mean)*	**Industry Norm** *(Mean)* *
1.	Product and service quality improvement *(4.38)*	Product and service quality improvement *(4.37)*	Product and service quality improvement *(4.36)*	Product and service quality improvement *(4.14)*	Product and service quality improvement *(4.35)*
2.	New product development *(4.13)*	Staff education and training *(4.27)*	Market development *(4.19)*	Staff education and training *(4.08)*	New product development *(4.12)*
3.	Market development *(4.12)*	New product development *(4.26)*	New product development *(4.04)*	New product development *(4.05)*	Market development *(4.10)*
4.	Product modification *(4.09)*	Product modification *(4.25)*	Product modification *(4.01)*	Market development *(3.99)*	Product modification *(4.07)*
5.	Importing technologies *(4.07)*	Importing technologies *(4.19)*	Market diversification *(3.95)*	Related Business development *(3.97)*	Importing technologies *(4.02)*

**Remarks*: The mean values of industry norm are abstracted from table 30.

6.4 Comparative Analysis of Hong Kong-Shanghai Studies

6.4.1 Response rates and respondents' profiles

The empirical survey was repeated in 2001 and questionnaires were mailed to senior executives in 100 selected companies in Shanghai. A total of 85 replies were received yielding a high response rate of 85 percent. Participants were advised that they could respond in a confidential or anonymous basis. Only seven firms opted for anonymity. The high response rate was attributable to the fact that the respondents were registered firms of a university-industry collaboration network and most of them were obliged to return the questionnaires. Table 32 outlines the sample demographics of Shanghai respondents as compared with those Hong Kong respondents in the 2001 survey.

In terms of industry representation, some 17.5 percent of Shanghai respondents were from the electronics sector, 12.9 percent from the textile and clothing sector, 52.9 percent from other manufacturing sectors. The rest (i.e. 17.6%) are manufacturing services companies. The figures were 25.9, 16.4, 22.0, and 35.8 percent for four industry categories, respectively in the Hong Kong's survey. 'Other manufacturing sectors' in Shanghai (some 53%) were dominating the scene; and these sectors were composed of both heavy industries (e.g. steel, energy, machinery, and shipbuilding) and light industries (e.g. petrochemicals, plastics, instruments, and computer products). In Hong Kong counterpart, these were light industry sectors including toys, plastics, watches and clocks. Besides, some 36 percent of Hong Kong respondents are manufacturing service companies, whereas this is only about 18 percent in Shanghai.

Table 32. Sample demographics of Hong Kong's versus Shanghai's respondents

Respondent Profiles	Hong Kong *(n = 232)*	Shanghai *(n = 85)*
Industry Sectors		
Electronics	60 (25.9%)	14 (16.5%)
Textile and Clothing	38 (16.4%)	11 (12.9%)
Other Manufacturing Industries	51 (22.0%)	45 (52.9%)
Manufacturing Services	83 (35.8%)	15 (17.6%)
Total in percentage:	232/980 (23.7%)	85/100 (85.0%)
Years of Establishment		
Less than one year	0 (0.0%)	4 (4.7%)
1-5 years	38 (16.4%)	23 (27.1%)
6-10 years	47 (20.3%)	31 (36.5%)
Over 10 years	147 (63.4%)	27 (31.8%)
People Hired in the City[1]		
1-20	60 (25.9%)	15 (17.6%)
21-50	66 (28.4%)	14 (16.5%)
51-100	42 (18.1%)	15 (17.6%)
101-200	26 (11.2%)	10 (11.8%)
Over 200	38 (16.4%)	31 (36.5%)
People Hired outside the City[1]		
0	13 (5.6%)	63 (74.1%)
1-20	12 (5.2%)	7 (8.2%)
21-50	7 (3.0%)	6 (7.1%)
51-100	12 (5.2%)	3 (3.5%)
101-200	36 (15.5%)	3 (3.5%)
Over 200	152 (65.5%)	3 (3.5%)
Major Markets		
Local (Hong Kong)	27 (11.6%)	–
Local (including other Provinces and Cities)	–	67 (78.8%)
Mainland China (including Shanghai)	54 (23.3%)	–
Americas (North and South)	93 (40.1%)	8 (9.4%)
Europe (Excluding Russia)	84 (36.2%)	8 (9.4%)
Asia Pacific (Excluding Mainland and Hong Kong)	39 (16.8%)	13 (17.2%)
Hong Kong	–	9 (10.5%)
Others	15 (6.5%)	3 (3.5%)
Single Market[2]	108 (46.6%)	66 (77.6%)
Capital Ownership		
Local - Hong Kong	139 (59.9%)	–
Local - Shanghai[3]	–	60 (70.6%)
Joint Ownership: Local (Hong Kong) and China	36 (15.5%)	–
Joint Ownership: Local (Shanghai[3]) and Hong Kong	–	10 (11.8%)
Joint Ownership: Local and Overseas partners	39 (16.8%)	8 (9.4%)
Others (e.g., Foreign Ownership)	18 (7.8%)	7 (8.2%)

Remarks:

[1] *Companies employing less than 200 people are classified as small and medium-sized enterprises.*

[2] *Other Provinces, Autonomous Regions and Municipalities in the Mainland are also considered as a single market*

[3] *The figures also include state-owned enterprises and capitals from other provinces in the Mainland.*

The findings indicate that the compositions of Hong Kong respondents were more versatile, export- and service-oriented than that of Shanghai respondents. This could be explained that Shanghai is one of mainland China's leading heavy industrial centres. The reform of foreign investment regulations in the 1990s precipitated a dramatic rise in the number of foreign-invested companies in Shanghai, but a vast majority of these foreign investments were geared toward the domestic rather than the export market (Enright *et al.*, 1997).

Regarding the sample demographics, some 68 percent of Shanghai companies started their businesses more than five years ago, whereas it was about 84 percent in Hong Kong. About 37 percent of Shanghai companies employed more than two hundred people, and the rest, including a vast majority of newly established companies, were SMEs. A majority (i.e. some 74%) of Shanghai respondents did not hire any people outside the city. For most of those who have overseas businesses and offices were employing less than two hundred employees (i.e. some 86.3%). A different scenario was found in Hong Kong which a majority of respondents (i.e. about 66%) claimed that their companies were employing more than two hundred people outside Hong Kong, particularly across the border to the southern China.

Another difference was found in the number of major markets of respondents. In 2001, Hong Kong companies exported extensively to the mainland, Americas and Europe, and some even have three to four markets. However, a single-market (i.e. about 77%) dominated the Shanghai enterprises. Some 79 percent of Shanghai enterprises relied significantly on domestic markets (including other provinces, autonomous regions, municipalities and cities). Despite this, Asia Pacific (i.e. 17%), Hong Kong (i.e. 9%),

Americas (i.e. 8%) and Europe (i.e. 8%) were the major overseas markets. Meanwhile, about 71 percent were local enterprises in Shanghai. The rest were either in joint ventures with Hong Kong investment (i.e. some 12%) and other overseas partners (i.e. about 9%), or with foreign ownership (i.e. about 8%). Hong Kong has been by far the largest external investor in Shanghai, accounting for more than 50 percent of the external investment in Shanghai since 1979 (Enright *et al.*, 1997). In Hong Kong, it was found that about 60 percent of respondents were local, and the rest were either joint venture with or owned by foreign or Chinese capital in the 2001 survey.

6.4.2 Proposition 1: Common success factors

As shown in table 33, the most common success factors in Hong Kong were product and service quality (i.e. mean = 4.35), customer services (i.e. mean = 4.18), cost of production and operations (i.e. mean = 4.13), company's reputation (i.e. mean = 4.11), and company's strategies (i.e. mean = 4.09). The standard deviations ranged from 0.59 (i.e. product and service quality) to 1.09 (i.e. company strategies), indicating small data variability. Similar findings were obtained from Shanghai respondents with an inclusion of market share (i.e. mean = 4.12) as the fifth success factor that replaced the cost of production and operations (i.e. ranked at 7th). Company's reputation (i.e. mean = 4.38; SD = 0.79) was top ranking success factor, followed by product and service quality (i.e. mean = 4.23; SD = 0.90) and company's strategies (i.e. mean = 4.23; SD = 0.84), and then customer services (i.e. mean = 4.15; SD = 0.91).

Table 33. Rankings of success factors: Hong Kong's versus Shanghai's organisations

Hong Kong Respondents		
Success factors and rankings	**Mean**	**SD**
1. Product and service quality	4.35	0.59
2. Customer services	4.18	0.75
3. Costs of production and operations	4.13	0.76
4. Company's reputation	4.11	0.93
5. Company's strategies	4.09	1.09
6. Accessibility to markets	4.07	0.82
7. Workforce skills and abilities	4.00	0.88
8. R&D and Innovation capabilities	3.94	0.92
9. Management commitment	3.93	0.98
10. Employee involvement	3.90	0.88
11. Market positioning	3.87	0.89
12. Company's policies	3.84	0.84
13. Market share	3.84	0.88
14. Availability of funds and capitals	3.80	0.86
15. Materials supply	3.78	0.94
16. Company's mission	3.75	0.78
17. Product mix and range	3.74	0.86
18. Availability of workforce	3.72	0.92
19. Information technology and systems	3.67	0.88
20. Company's location	3.40	0.98

Shanghai Respondents		
Success factors and rankings	**Mean**	**SD**
1. Company's reputation	4.38	0.79
2. Product and service quality	4.23	0.90
3. Company's strategies	4.23	0.84
4. Customer services	4.15	0.91
5. Market share	4.12	0.88
6. R&D and Innovation capabilities	4.09	0.99
7. Costs of production and operations	4.03	0.96
8. Workforce skills and abilities	3.98	0.96
9. Company's policies	3.92	1.00
10. Accessibility to markets	3.89	0.98
11. Management commitment	3.88	0.93
12. Market positioning	3.86	0.84
13. Product mix and range	3.73	0.90
14. Availability of funds and capitals	3.66	1.06
15. Company's mission	3.61	1.05
16. Information technology and systems	3.61	1.19
17. Employee involvement	3.51	0.90
18. Materials supply	3.37	0.98
19. Availability of workforce	3.26	1.02
20. Company's location	3.08	1.07

Remarks: Mean (based on 1 = the least agreed, and 5 = the most agreed); SD = Standard deviation

A vast majority of respondents agreed that good product/service quality and customer service determined their abilities to gain, attract and retain customers. Evidence shows that both company reputation and sound strategies could assist many respondents to compete in the changing market trends. R&D and innovation capabilities, competent workforce, and management commitment were the important contributors of business

success. With respect to Hong Kong, better management of production/operations costs (i.e. 3rd place) safeguarded profit margin during the post-1997 economic recession. Many Hong Kong respondents argued that their competitive advantages were built upon accessibility to markets (i.e. 6th place) and employee involvement (i.e. 10th place). Meanwhile, the Shanghai respondents placed greater weights on market share (i.e. 5th place) and the company's policies (i.e. 9th place). Almost all respondents claimed that the company's location was the least significant factor in both cities.

The use of the size of the company for additional analysis permitted more comparisons from the survey findings. Company were classified by size, dependent on the number of employees hired; as small/medium (200 or less) and large (201 or more). The employees hired in overseas plants, offices or branches were excluded. When examining this variable in responses, it shows that size of company was not related to the common success factors, and the findings in the SME group coincided with that of large company group. Significant associations between size of organisation and success factors for both groups are summarised in table 34, with *p*-values quoted to three decimal places based on the usual convention of the 5 percent and 1 percent levels. In case of Hong Kong, the common success factors showing significant associations in SMEs (n = 194) and large companies (n = 38) included availability of funds and capital (p = 0.030*; p = 0.036*), company's strategies (p = 0.019*; p = 0.009**), costs of production and operation (p = 0.003**; p = 0.007**), customer services (p = 0.018*; p = 0.025*), product and service quality (p = 0.005**; p = 0.009**), and workforce skills and abilities (p = 0.040*; p = 0.038*), respectively. Hong Kong's SMEs also opted company's reputation (p = 0.011*), while large companies stressed management commitment (p = 0.031*).

Table 34. Significant associations between size of organisation and success factors

Success Factors:	Hong Kong		Shanghai	
	SME (n = 194)	Large (n = 38)	SME (n = 54)	Large (n = 31)
1. Accessibility to markets				
2. Availability of funds and capitals	0.030*	0.036*		
3. Availability of workforce				
4. Company's location			0.038*	
5. Company's mission				
6. Company's policies				0.018*
7. Company's reputation	0.011*		0.038*	0.009**
8. Company's strategies	0.019*	0.009**	0.023*	0.034*
9. Costs of production and operation	0.003**	0.007**		
10. Customer services	0.018*	0.025*	0.015*	0.041*
11. Employee involvement				
12. Information technology and systems				
13. Management commitment		0.031*		
14. Market share				0.034*
15. Market positioning				
16. Materials supply				
17. Product mix and range				
18. Product and service quality	0.005**	0.009**	0.023*	0.040*
19. R&D and Innovation capabilities				0.005**
20. Workforce skills and abilities	0.040*	0.038*	0.042*	0.036*

*Remarks: * significant at the 5 percent level; ** significant at the 1 percent level*

With respect to both respondent groups of SMEs (n = 54) and large companies (n = 31) in Shanghai, significant associations were found in company's reputation (p = 0.038*; p = 0.009**), company's strategies (p = 0.023*; p = 0.034*), customer services (p = 0.015*; p = 0.041*), product and service quality (p = 0.023*; p = 0.040*), and workforce skills and abilities (p = 0.042*; p = 0.036*), respectively. Besides, it shows significant associations for large companies adopting company's policies (p = 0.018*), R&D and innovation capabilities (p = 0.005**). Therefore, despite some minor differences between SMEs and large companies as explained above, most respondents in Shanghai shared similar views on the success factors that were dominating their business practices as those in Hong Kong.

The evidence shows that there was common ground between Hong Kong and Shanghai respondents with regard to the focus on success factors. Therefore, with reference to samples of Hong Kong and Shanghai respondents, the results verify the proposition that *manufacturing firms assess their success factors with similar focus, irrespective of their size*.

6.4.3 Proposition 2: Business and operational problems

Table 35 shows the ranking of problems encountered from both Hong Kong's and Shanghai's respondents. The business scenario has changed dramatically during the economic turmoil in 1997-1998 in Hong Kong and Shanghai. Fierce overseas competition, increasing production costs and insufficient R&D have forced a lot of less-performed or weak firms out of business. Besides, as China's economic door continues to remain open, more local and foreign companies will establish their business and operation base in China, leading to keen competition. With respect to their business operations, most respondents generally agreed on the prioritised problems, with keen local competition as the most concern. This was associated with increasing production costs, strong overseas competitors, and insufficient research and development. The mean scores of these prioritised problems ranged from 3.60 to 3.85 in Hong Kong, and from 3.11 to 3.52 in Shanghai, respectively. Their standard deviations fell into a range from 0.69 (i.e. increasing production costs) to 0.98 (i.e. insufficient R&D) in Hong Kong; and from 1.04 (i.e. increasing production costs) to 1.07 (i.e. keen local competition) in Shanghai, respectively.

Table 35. Ranking of problems: Hong Kong's versus Shanghai's organisations

Hong Kong Respondents		
Problems and rankings	**Mean**	**SD**
1. Keen local competition	3.85	0.71
2. Increasing production costs	3.77	0.69
3. Strong overseas competitors	3.75	0.93
4. Insufficient research and development	3.60	0.98
5. Few current and/or potential markets	3.23	1.20
6. Lack of government support	3.23	1.03
7. High employee turnover	3.18	0.82
8. Cash flow problems	3.04	0.88
9. Effects of protectionism	2.99	0.92
10. Few suppliers and/or vendors	2.93	0.96
11. Low productivity	2.92	0.71
12. Political influence	2.57	0.79

Shanghai Respondents		
Problems and rankings	**Mean**	**SD**
1. Keen local competition	3.52	1.07
2. Strong overseas competitors	3.47	1.07
3. Increasing production costs	3.12	1.04
4. Insufficient research and development	3.11	1.06
5. Cash flow problems	2.91	1.15
6. Few current and/or potential markets	2.85	1.21
7. High employee turnover	2.79	0.89
8. Low productivity	2.74	1.05
9. Effects of protectionism	2.58	0.99
10. Few suppliers and/or vendors	2.48	1.00
11. Lack of government support	2.36	1.00
12. Political influence	1.90	0.89

Remarks: Mean (based on 1 = the less significance, and 5 = the most significance); SD = Standard deviation

Many Hong Kong respondents were concerned with the problems of few current and/or potential markets (i.e. 5th place; mean = 3.23) and lack of government support (i.e. 6th place; mean = 3.24), whereas Shanghai respondents stressed the problems associated with poor cash flow (i.e. 5th place, mean = 2.91) and low productivity (i.e. 8th place, mean = 2.74). Other problem areas included high employee turnover (i.e. 7th place), effects of protectionism (i.e. 9th place), few suppliers and/or vendors (i.e. 10th place) and political influences (i.e. 12th place), the rankings in both cities were indifference. Arguably, many Hong Kong respondents put lower emphasis (i.e. 11th place) on productivity problems. After the economic turmoil in 1997-1998, the effect of productivity has become less importance

than that of keen local competition, increasing production costs, etc for safeguarding a firm's survival in Hong Kong (as discussed in Sub-section 6.3.4). Shanghai respondents considered lacking government support as one of the least problem areas (i.e. 11th place). Shanghai has been the epitome of the Mainland's state planned economy, and the influences and support from the government to firms, particularly for those state-owned enterprises and succeeding independent companies, were substantive in many ways (e.g. receiving massive subsidies, and retaining priority access to raw materials, inputs, and skilled personnel).

While examining the size of companies in conjunction with the list of problem areas, significant associations of prioritised problems for both groups of SME and large companies are summarised in table 36, with *p*-values quoted to three decimal places based on the usual convention of the 5 percent and 1 percent levels. In case of Hong Kong, the common problem areas showing significant associations in SMEs (n = 194) and large companies (n = 38) included high employee turnover (p = 0.018*; p = 0.032*), increasing production costs (p = 0.007**; p = 0.019**), keen local competition (p = 0.005**; p = 0.004**), and strong overseas competitors (p = 0.025**; p = 0.33*). Besides, it was significant for large companies encountering insufficient R&D (p = 0.038*) and for SMEs arguing few current and/or potential markets (p = 0.043*). While comparing the findings in Shanghai, significant associations were found in four problem areas that applied for both respondent groups of SMEs (n = 54) and large companies (n = 31). These included increasing production costs (p = 0.012*; p = 0.004**), insufficient R&D (p = 0.011*; p = 0.016*), keen local competition (p = 0.002**; p = 0.017*), and strong overseas competitors (p = 0.037*; p = 0.007**), respectively. Besides, there were no significant

associations found in Shanghai's respondents regarding high employee turnover and few current and/or potential markets compared to that in Hong Kong.

Table 36. Significant associations between size of organisation and problem areas

Problem Areas:	**Hong Kong**		**Shanghai**	
	SME (n = 194)	**Large** (n = 38)	**SME** (n = 54)	**Large** (n = 31)
1. Cash flow problems				
2. Effects of protectionism				
3. Few current and/or potential markets	0.043*			
4. Few suppliers and/or vendors				
5. High employee turnover	0.018*	0.032*		
6. Increasing production costs	0.007**	0.019*	0.012*	0.004**
7. Insufficient research and development		0.038*	0.011*	0.016*
8. Keen local competition	0.005**	0.004**	0.002**	0.017*
9. Lack of government support				
10. Low productivity				
11. Political influence				
12. Strong overseas competitors	0.025*	0.033*	0.037*	0.007**

*Remarks: * Significant at the 5 percent level; ** significant at the 1 percent level*

The results show that the deviations of respondents' views were minimal on those problem areas identified in both Shanghai and Hong Kong, irrespective of the size of company. Hong Kong companies considered high employee turnover, while Shanghai companies tended to stress more on insufficient R&D. However, there was common ground between Hong Kong and Shanghai respondents with regards to the identification of business and operational problems. Therefore, with respect to the current business situations in Hong Kong and Shanghai, the results verify the proposition that *manufacturing firms encounter similar business and operational problems, irrespective of their size.*

6.4.4 *Proposition 3: Impact of success factors and problems on strategy choices*

Table 37 shows that both Hong Kong and Shanghai respondents agreed on four (out of five) most preferred strategy choices, though their positions varied with respect to their success factors and the problems being encountered.

Table 37. Ranking of strategy choices: Hong Kong's versus Shanghai's organisations

Hong Kong Respondents		
Strategies and rankings	**Mean**	**SD**
1. Product and service quality improvement	4.35	0.74
2. New product development	4.12	0.81
3. Market development	4.10	0.73
4. Product modification	4.07	0.77
5. Importing technologies	4.02	0.88
6. Staff education and training	3.94	0.76
7. Market diversification	3.88	0.88
8. Sub-contracting	3.88	0.86
9. Strengthening research and development	3.77	1.19
10. Product diversification	3.73	0.76
11. Production automation	3.70	0.95
12. Related Business development	3.63	0.96
13. Product line extension	3.56	0.94
14. Vertical integration	3.48	0.92
15. New business development	3.19	1.09
16. Horizontal integration	3.16	1.06
17. Selective investments	3.13	0.93
18. Business withdrawal or divestment	3.01	1.01
19. Joint ventures	2.98	0.98
20. Importing workforce	2.65	0.85

Shanghai Respondents		
Strategies and rankings	**Mean**	**SD**
1. Market development	4.38	0.71
2. Importing technologies	4.23	1.03
3. New product development	4.18	1.08
4. Strengthening research and development	4.03	0.93
5. Product modification	4.00	0.91
6. Product and service quality improvement	3.97	0.97
7. New business development	3.94	1.01
8. Vertical integration	3.81	1.01
9. Staff education and training	3.78	0.96
10. Production automation	3.73	1.00
11. Related Business development	3.59	1.24
12. Product diversification	3.58	1.08
13. Market diversification	3.52	1.21
14. Selective investments	3.44	1.01
15. Product line extension	3.22	1.17
16. Horizontal integration	3.16	1.12
17. Sub-contracting	2.79	1.07
18. Business withdrawal or divestment	2.58	1.21
19. Importing workforce	2.55	1.17
20. Joint ventures	2.46	1.03

Remarks: Mean (based on 1 = the least agreed, and 5 = the most agreed); SD = Standard deviation

From the Hong Kong's findings, they were ranked in order of the product and service quality improvement (i.e. mean = 4.35; SD = 0.74), new product development (i.e. mean = 4.12; SD = 0.81), market development (i.e. mean = 4.10; SD = 0.73), product modification (i.e. mean = 4.07; SD = 0.77), and importing technologies (i.e. mean = 4.02; SD = 0.88). For Shanghai, the five preferred strategies became market development (i.e. mean = 4.38; SD = 0.71), importing technologies (i.e. mean = 4.23; SD = 1.03) new product development (i.e. mean = 4.18; SD = 1.08), strengthening R&D (i.e. mean = 4.03; SD = 0.93), and product modification (i.e. mean = 4.00; SD = 0.91). The product and service quality improvement (i.e. mean = 3.97; SD = 0.97) dropped to sixth place. It shows that a high level of consensus on the preferred manufacturing strategies choices existed within and across industry sectors in both cities under investigation.

Some recent literature (e.g. Enright *et al*., 1997; Xu, 1996; Yue, 1996) argues that Shanghai dominates in basic research and high-tech development, whereas Hong Kong's strength lies in applied technology. Arguably, the issues of importing technologies and fostering R&D do not necessarily contradict. Indeed, they can be complimentary with each other and therefore, Shanghai's respondents put a strong emphasis on the importance of importing new and adaptable technology (i.e. 2nd place) in line with their current R&D activities (i.e. 4th place). On the other hand, Hong Kong respondents placed importing technologies in fourth place and strengthening R&D (i.e. mean = 3.77; SD = 1.19) in ninth place. In examining the rest of listed strategy choices, the findings show that there was a quite divergent result between Hong Kong and Shanghai respondents. For instance, most Hong Kong respondents stressed staff education and training (i.e. 6th place, mean = 3.94) and market diversification (i.e. 7th place, mean = 3.88), and relied on sub-contracting (i.e.

8th place, mean = 3.88). On the Shanghai side, many respondents stressed new business development (i.e. 7th place, mean = 3.94), vertical integration (i.e. 8th place, mean = 3.81), and staff education and training (i.e. 9th place, mean = 3.78). Surprisingly, Shanghai respondents placed less emphasis on market diversification (i.e. 13th place) and sub-contracting (i.e. 17th place). Hong Kong respondents also considered new business development and vertical integration as 15th and 14th respectively. Meanwhile, both Shanghai and Hong Kong respondents shared similar agreement about the rankings of horizontal integration (i.e. 16th place) and business withdrawal or divestment (i.e. 18th place), and commanded the least attentions on considering importing labours and joint ventures as preferred strategy choices.

While examining the size of company in conjunction with the list of strategy choices, it shows that this variable was related to their preference of strategy choices. Significant associations between size of organisation and strategy choices for respondents are summarised in table 38, with *p*-values quoted to three decimal places based on the usual convention of the 5 percent and 1 percent levels. In case of Hong Kong, the strategy choices showing significant associations in SMEs (n = 194) and large companies (n = 38) included importing technologies (p = 0.020*; p = 0.008**), market development (p = 0.014*; p = 0.023*), product modification (p = 0.017*; p = 0.027*), product/service quality improvement (p = 0.003**; p = 0.004**), and sub-contracting (p = 0.008**; p = 0.016*). It also shows significant associations for large companies considering market diversification (p = 0.026*), new product development (p = 0.031*), and staff education and training (p = 0.030*) as preferred strategy choices. The results indicate that the listed strategy choices were in more widespread use amongst larger companies in Hong Kong.

Table 38. Significant associations between size of organisation and strategy choices

Strategy Choices:	Hong Kong		Shanghai	
	SME (n = 194)	Large (n = 38)	SME (n = 54)	Large (n = 31)
1. Business withdrawal or divestment				
2. Horizontal integration				
3. Importing technologies	0.020*	0.008**	0.023*	0.013*
4. Importing workforce				
5. Joint ventures				
6. Market development	0.014*	0.023*	0.035*	0.007**
7. Market diversification		0.026*		
8. New business development				0.011*
9. New product development		0.031*	0.018*	0.019*
10. Product diversification				
11. Product-line extension				
12. Product modification	0.017*	0.027*		
13. Product/service quality improvement	0.003**	0.004**		
14. Production automation				
15. Related business development				
16. Selective investments				
17. Staff education and training		0.030*		0.036*
18. Strengthening R&D			0.014*	0.003**
19. Sub-contracting	0.008**	0.016*		
20. Vertical integration				

*Remarks: * Significant at the 5 percent level; ** significant at the 1 percent level*

With respect to both respondent groups of SMEs (n = 54) and large companies (n = 31) in Shanghai, significant associations were found in importing technologies (p = 0.023*; p = 0.013*), market development (p = 0.035*; p = 0.007**), new product development (p = 0.018*; p = 0.019*), and strengthening R&D (p = 0.014*; p = 0.003**), respectively. Significant associations for large companies considering new business development (p = 0.011*) and staff education and training (p = 0.036*) as preferred strategy choices are also shown. This indicates that to sustain competitiveness, larger companies in Shanghai tended to have greater needs and organisational resources to consider more strategy choices than

SME did.

The third proposition advocates that *manufacturing firms determine strategy choices with respect to their success factors and the problems encountered.* Evidence shows that the vast majority of respondents agreed with the adoption of the most preferred strategy choices (such as new product development, market development, product modification, product/service quality improvement, importing technologies, strengthening R&D, staff education and training). Manufacturing enterprises in both cities have a similar focus on the success factors identified and problems encountered, irrespective of the size of companies in both cities (see discussed in two previous sub-sections 6.4.2 and 6.4.3). The proposition can be accepted. However, it should be noted that due to the differences in social, legal, economic, and political profiles in both cities, for instance, many Hong Kong manufacturers would stress the importance of market diversification and sub-contracting, whereas Shanghai manufacturers would consider new business development and vertical integration.

6.5 Assessment of Strategy Determinants and Components

6.5.1 Ranking of strategy determinants and components

Respondents were asked to express their views on the relative importance of twelve components which were placed under four categories of strategy determinants, including corporate, marketing, technology, and operational strengths. These components were

compiled from a list of common success factors addressed in the survey questionnaire (Pun, 1998). The question served two purposes, namely 1) to group factors under specified category of determinants for facilitating analysis; and 2) to help validate the reliability and consistency of respondents' views on these factors/components. A five-point Likert scale of rating was used ranging from 1, the least important, to 5, the most important.

After calculating the mean scores of each statements and categories, it was found that respondents' rankings of success factors coincided with components of strategy determinants. Table 39 shows that Hong Kong respondents have higher mean scores on most strategy determinants (i.e. three out of four) and individual components (i.e. 83%). In terms of the priority of ranking, Hong Kong firms stressed marketing strengths with a highest weighted mean of 4.21, followed by corporate strengths (i.e. mean = 4.08), operational strengths (i.e. mean = 4.00) and then technology strengths (i.e. mean = 3.80). The Shanghai firms also ranked marketing strengths as the prioritised determinant with a weighted mean of 4.10. The relative importance of three other determinants, including technology strengths (i.e. mean = 3.87), corporate strengths (i.e. mean = 3.86), and operational strengths (i.e. mean = 3.85) were close, indicating that they were almost of equal importance in Shanghai.

Three prioritised components from Hong Kong respondents were product and services quality (mean = 4.47; SD = 0.77), company's reputation (mean = 4.22; SD = 0.76), and costs of production and operations (mean = 4.22; SD = 0.82). Similar findings were obtained from Shanghai respondents with company's reputation (i.e. mean = 4.31; SD = 0.92) as being the first, followed by product and services quality (i.e. mean = 4.19; SD = 0.88) and costs of production and operations (i.e. mean = 4.08; SD = 0.94).

Table 39. Comparative analysis of strategy determinants and components

Strategy Determinants and Components	**Hong Kong**[@] Mean[*]	*SD*[**]	**Shanghai**[@] Mean[*]	*SD*[**]
a. Corporate Strengths:	4.08[***]	--	3.86[***]	--
1. Availability of funds and capitals	**4.15**	**0.77**	**3.91**	**0.86**
	(3.80)	*(0.86)*	*(3.66)*	*(1.06)*
2. Company's mission	**3.90**	**0.88**	**3.71**	**0.94**
	(3.75)	*(0.78)*	*(3.61)*	*(1.05)*
3. Management commitment	**4.18**	**0.64**	**3.95**	**0.88**
	(3.93)	*(0.98)*	*(3.88)*	*(0.93)*
b. Marketing Strengths:	4.21[***]	--	4.10[***]	--
4. Accessibility to markets	**4.20**	**0.74**	**4.00**	**0.82**
	(4.07)	*(0.82)*	*(3.89)*	*(0.98)*
5. Company's reputation	**4.22**	**0.76**	**4.31**	**0.92**
	(4.11)	*(0.93)*	*(4.38)*	*(0.79)*
6. Market positioning	**3.96**	**0.84**	**3.88**	**0.86**
	(3.87)	*(0.89)*	*(3.86)*	*(0.84)*
7. Product and service quality	**4.47**	**0.77**	**4.19**	**0.88**
	(4.35)	*(0.59)*	*(4.23)*	*(0.90)*
c. Technology Strengths:	3.80[***]	--	3.87[***]	--
8. Information technology and systems	**3.79**	**0.85**	**3.71**	**1.07**
	(3.67)	*(0.88)*	*(3.61)*	*(1.19)*
9. R&D and innovation capabilities	**3.81**	**0.96**	**4.03**	**0.98**
	(3.94)	*(0.92)*	*(4.09)*	*(0.99)*
d. Operational Strengths:	4.00[***]	--	3.85[***]	--
10. Company's location	**3.73**	**0.86**	**3.57**	**0.93**
	(3.40)	*(0.98)*	*(3.08)*	*(1.07)*
11. Costs of production and operations	**4.22**	**0.82**	**4.08**	**0.94**
	(4.13)	*(0.76)*	*(4.03)*	*(0.96)*
12. Workforce skills and abilities	**4.04**	**0.84**	**3.91**	**0.76**
	(4.00)	*(0.88)*	*(3.98)*	*(0.96)*

Remarks:

[@] *The numbers of Hong Kong and Shanghai respondents are 232 and 85, respectively.*

* *Mean Rating (Based on 5-point Likert scale, 1 = the least important; 5 = the most important)*

** *Standard Deviation*

*** *Weighted mean of individual category of strategy determinants*

( ) Figures of corresponding components are abstracted from Table 33 for the purposes of verification and comparison

Besides, Shanghai respondents stressed R&D and innovation capabilities (i.e. mean = 4.03; SD = 0.98), while Hong Kong respondents opted to the importance of management commitment (i.e. mean = 4.08; SD = 0.84). Surprisingly, both Hong Kong and Shanghai groups also put lower emphasis on company's location (with a mean of 3.73 and 3.57, and SD of 0.86 and 0.93, respectively), compared with two other components of the operational strengths (i.e. costs of production/operations, and workforce skills and abilities).

The standard deviations of almost all components (except workforce skills and abilities) obtained from Shanghai respondents were greater than that from Hong Kong respondents. The possible explanation can be that all Hong Kong respondents were private firms, whereas the Shanghai respondents represented state-owned enterprises, private and foreign joint-venture firms. The organisational culture and management systems vary greatly across different types of enterprises, and particularly, the state-owned enterprises versus foreign joint-venture firms in Shanghai, leading to a greater range of standard deviations in the findings.

When comparing individual components with the respondents' perception on the importance of success factors for their organisations, two interesting findings were noted. 1) Respondents generally gave a higher mean score on components, and 2) the standard deviation of individual components was generally smaller, as compared to the equivalent success factors. Same results were found in both Hong Kong and Shanghai, with very few exceptions. In the Shanghai case, two components (i.e. R&D and innovation capabilities, and workforce skills and abilities) have smaller mean scores and another two components (i.e. company's reputation and

market position) have greater standard deviation than that of corresponding factors (see table 39). The comparative analysis of strategy determinants shows that the groupings of components under these determinants helped respondents to re-examine the relative importance among the components/factors with respect to their corporate, marketing, technology and operational strengths. It shows a higher consistence of overall results compared to the previous analysis in Sub-sections 6.3.2 and 6.4.2.

6.5.2 Hypothesis 1: Corporate strengths and strategy choices

Using the four strategy determinants as dependent variables, the study examined the validity of the causal links between them and the adoption of 'reactive/proactive' manufacturing strategies (i.e. independent variables). Four hypotheses that constituted the relationships were established, and hypothesis testing was carried out to attain quantitative results for Hong Kong and Shanghai surveys. The first hypothesis is stated in the null and alternate as follows:

$H1_O$: Corporate strengths will affect strategy choices of manufacturing enterprises.

$H1_A$: There will be no direct effect of corporate strengths on strategy choices of manufacturing enterprises.

The proposition is that corporate strengths will affect the determination of manufacturing strategy choices. It has two sub-hypotheses. That is, the stronger the corporate strengths of an organisation, the higher the intent of adoption of reactive strategies (i.e. hypothesis $H1_a$) and proactive strategies (i.e. hypothesis $H1_b$) will be. The collated results of

two predetermined questions (i.e. Q.8 and Q.10 of survey questionnaire, see Annex 1.1 of *Appendix 1*) were used as testing parameters to establish the causal link. Two test groups of firms were determined according to the calculated mean scores (i.e. one group of a mean score equal or greater than 3.0 and the other less than 3.0). Table 40 shows that, the p_1 values were greater than the 95 percent confidence level for both one-tail test (i.e. 0.050) and two-tail test (i.e. 0.025), but the p_2 values were smaller than 0.05 for one-tail test.

Table 40. Hypothesis testing results for corporate strengths and strategy choices

Null Hypotheses	**Test Parameters and Groupings*** - 'Q' refers to the parameter questions used. - Two test groups determined according to the computed mean values of the question, i.e. *Group 1: $Q_{Mean} \geq 3.0$; Group 2: $Q_{Mean} < 3.0$*	**p-values for F-test (p_1); p-value for t-test in equal variance row (p_2)** - If $p_2 > 0.05$, the hypothesis will be rejected		**Test Results** - At a 95% confidence level
$H1_a$	Corporate strengths (*Q.10a*) affect the determination of *reactive* strategies (*Q.8a*) **Group 1: Q.10a ≥ 3.0; Group 2: Q.10a < 3.0*	HK**	$p_1 = 0.125$; $p_2 = 0.040$	Accepted
		SG**	**$p_1 = 0.648$; $p_2 = 0.045$**	**Accepted**
$H1_b$	Corporate strengths (*Q.10a*) affect the determination of *proactive* strategies (*Q.8b*) **Group 1: Q.10a ≥ 3.0; Group 2: Q.10a < 3.0*	HK**	$p_1 = 0.298$; $p_2 = 0.028$	Accepted
		SG**	**$p_1 = 0.402$; $p_2 = 0.046$**	**Accepted**

Remarks: * *See Annex 1.1 of Appendix 1*

** HK *and* **SG** *represent the results of Hong Kong's and* ***Shanghai's*** *surveys, respectively.*

The *p*-values were 0.125 (i.e. p_1 for *F*-test) and 0.040 (i.e. p_2 for the *t*-test in the equal variance row) in Hong Kong firms, whereas they were $p_1 = 0.648$ and $p_2 = 0.045$ in Shanghai firms. The null hypothesis was accepted, indicating that there was significant association between corporate strengths and the adoption of 'reactive/proactive' manufacturing strategies in both groups. Evident shows that corporate strengths would affect the determination of reactive strategies and proactive strategies or a mix of them. Corporate strengths (comprising

management commitment, company's mission, and availability of funds and capitals) are key determinants for organisational success in various endeavours. Top management commitment would promote the creation of visible corporate values and mission. This in turn would provide employees a clear direction to respond to the organisation's needs, and guide the formulation of organisational strategies, irrespective of the reactive or proactive nature. Availability of funds and capitals would provide the resources and safeguard the implementation of the preferred strategy options in manufacturing enterprises.

6.5.3 Hypothesis 2: Marketing strengths and strategy choices

The second hypothesis advocates that marketing strengths will determine the adoption of manufacturing strategy choices in organisations. It can be stated in the null and alternate as follows:

$H2_O$: Marketing strengths will affect strategy choices of manufacturing enterprises.

$H2_A$: There will be no direct effect of marketing strengths on strategy choices of manufacturing enterprises.

Similarly, there are two sub-hypotheses. One is concerned with the adoption of reactive strategies (i.e. hypothesis $H2_a$) and the other adopts proactive strategies (i.e. hypothesis $H2_b$) in manufacturing enterprises. The proposition is that the stronger the marketing strengths of an organisation, the higher the intent of adoption of these strategies will be. Table 41 shows that the hypothesis was accepted with the computed p_2 values less than 0.050 (i.e. 2-tail test) for the adoption of both reactive and proactive strategies. In case of hypothesis $H2_a$ for Hong Kong

group, the p_2 value was less than 0.025 (i.e. 1-tail test). Statistical evidence shows that marketing strengths would determine the adoption of reactive and proactive strategies in manufacturing enterprises. During the strategy formulation process, company's reputation, product and service quality, the accessibility to markets, and market positioning are influential determinants. The findings coincided with the previous analysis in Sub-section 6.4.1. Both company's reputation and product/service quality were the leading components, whereas mean scores of accessibility to markets and market positioning were in high ranks compared to other components.

Table 41. Hypothesis testing results for marketing strengths and strategy choices

Null Hypotheses	**Test Parameters and Groupings*** - 'Q' refers to the parameter questions used. - Two test groups determined according to the computed mean values of the question, i.e. *Group 1: $Q_{Mean} \geq 3.0$; Group 2: $Q_{Mean} < 3.0$*	**p-values for F-test (p_1); p-value for t-test in equal variance row (p_2)** - If $p_2 > 0.05$, the hypothesis will be rejected		**Test Results** - At a 95% confidence level
$H2_a$	Marketing strengths (*Q.10b*) affect the determination of *reactive* strategies (*Q.8a*) *Group 1: Q.10b ≥ 3.0; Group 2: Q.10b < 3.0	HK**	$p_1 = 0.000$; $p_2 = 0.041$	Accepted
		SG**	**$p_1 = 0.143$; $p_2 = 0.049$**	**Accepted**
$H2_b$	Marketing strengths (*Q.10b*) affect the determination of *proactive* strategies (*Q.8b*) *Group 1: Q.10b ≥ 3.0; Group 2: Q.10b < 3.0	HK**	$p_1 = 0.000$; $p_2 = 0.021$	Accepted
		SG**	**$p_1 = 0.138$; $p_2 = 0.042$**	**Accepted**

Remarks: * *See Annex 1.1 of Appendix 1*

** HK *and* **SG** *represent the results of Hong Kong's and* ***Shanghai's*** *surveys, respectively.*

6.5.4 Hypothesis 3: Technology strengths and strategy choices

The third hypothesis can be stated in the null and alternate as follows:

$H3_O$: Technology strengths will affect strategy choices of manufacturing enterprises.

$H3_A$: There will be no direct effect of technology strengths on strategy choices of manufacturing enterprises.

The two sub-hypotheses include one for adopting reactive strategies (i.e. hypothesis $H3_a$) and the other for proactive strategies (i.e. hypothesis $H3_b$) in manufacturing enterprises. The proposition is that the stronger the technology strengths of an organisation, the higher the intent of adoption of these strategies will be. Statistical evidence shows that the null hypothesis was accepted for the Shanghai group but was partly accepted for the Hong Kong group (see table 42). Technology strengths would affect the adoption of reactive strategies ($p_2 = 0.026$) and proactive strategies ($p_2 = 0.039$) in the Shanghai group. For Hong Kong, hypothesis $H3_a$ was accepted because the p_2 value was 0.047 at the 95 percent confidence level. However, hypothesis $H3_b$ was rejected with the *p*-values greater than 0.050 (i.e. $p_1 = 0.370$ and $p_2 = 0.102$).

The results show that the Shanghai group stressed the importance of technology components (i.e. R&D and innovation capabilities, and information technology and systems) for the formulation of organisational strategies. Many Shanghai manufacturers have been attempting to increase their edge by importing technologies and development of their technological capability with the support and encouragement from government. On the other hand, many Hong Kong manufacturers relied on their market niches rather than concentrate on R&D or high-technology. They stressed flexibility in responding at high speed to new and emerging trends, and aimed at beating competitors to the market by recognising new trends more quickly, and capturing a high margin of profit by being first to

respond (see Sub-section 6.3.5). Besides, Hong Kong has suffered from the lack of government policy and direction of development. Many Hong Kong firms would prefer importing and adopting technology to spending more on their own R&D. This helps explain that the emphasis of technology components would not affect the adoption of proactive manufacturing strategies in Hong Kong firms.

Table 42. Hypothesis testing results for technology strengths and strategy choices

Null Hypotheses	**Test Parameters and Groupings*** - 'Q' refers to the parameter questions used. - Two test groups determined according to the computed mean values of the question, i.e. *Group 1: $Q_{Mean} \geq 3.0$; Group 2: $Q_{Mean} < 3.0$*	**p-values for F-test (p_1); p-value for t-test in equal variance row (p_2)** - If $p_2 > 0.05$, the hypothesis will be rejected		**Test Results** - At a 95% confidence level
$H3_a$	Technology strengths (*Q.10c*) affect the determination of *reactive* strategies (*Q.8a*) *Group 1: Q.10c ≥ 3.0; Group 2: Q.10c < 3.0	HK**	$p_1 = 0.386$; $p_2 = 0.047$	Accepted
		SG**	**$p_1 = 0.611$; $p_2 = 0.026$**	**Accepted**
$H3_b$	Technology strengths (*Q.10c*) affect the determination of *proactive* strategies (*Q.8b*) *Group 1: Q.10c ≥ 3.0; Group 2: Q.10c < 3.0	HK**	$p_1 = 0.370$; $p_2 = 0.102$	*Rejected*
		SG**	**$p_1 = 0.495$; $p_2 = 0.039$**	**Accepted**

Remarks: * *See Annex 1.1 of Appendix 1*

** HK *and* **SG** *represent the results of Hong Kong's and* ***Shanghai's*** *surveys, respectively.*

6.5.5 *Hypothesis 4: Operational strengths and strategy choices*

The fourth hypothesis can be stated in the null and alternate as follows:

$H4_O$: Operational strengths will affect strategy choices of manufacturing enterprises.

$H4_A$: There will be no direct effect of operational strengths on strategy choices of manufacturing enterprises.

The hypothesis advocates that the stronger the operational strengths of an organisation, the higher the intent of adoption of reactive strategies (i.e. hypothesis $H4_a$) and proactive strategies (i.e. hypothesis $H4_b$) will be. The sub-hypothesis $H4_a$ was accepted in both Hong Kong and Shanghai groups as shown in table 43. Another sub-hypothesis $H4_b$ was rejected with *p*-values of greater than 0.50 at the 95 percent confidence level (i.e. $p_1 = 0.187$ and $p_2 = 0.056$ from Hong Kong group; and $p_1 = 0.113$ and $p_2 = 0.108$ from Shanghai group, respectively). The results suggest that the null hypothesis could be partly accepted.

Table 43. Hypothesis testing results for operational strengths and strategy choices

Null Hypotheses	**Test Parameters and Groupings*** - 'Q' refers to the parameter questions used. - Two test groups determined according to the computed mean values of the question, i.e. *Group 1: $Q_{Mean} \geq 3.0$; Group 2: $Q_{Mean} < 3.0$*	**p-values for F-test (p_1); p-value for t-test in equal variance row (p_2)** - If $p_2 > 0.05$, the hypothesis will be rejected		**Test Results** - At a 95% confidence level
$H4_a$	Operational strengths (*Q.10d*) affect the determination of *reactive* strategies (*Q.8a*) *Group 1: Q.10d ≥ 3.0; Group 2: Q.10d < 3.0	HK**	$p_1 = 0.145$; $p_2 = 0.023$	Accepted
		SG**	**$p_1 = 0.210$; $p_2 = 0.044$**	**Accepted**
$H4_b$	Operational strengths (*Q.10d*) affect the determination of *proactive* strategies (*Q.8b*) *Group 1: Q.10d ≥ 3.0; Group 2: Q.10d < 3.0	HK**	$p_1 = 0.187$; $p_2 = 0.056$	*Rejected*
		SG**	**$p_1 = 0.113$; $p_2 = 0.108$**	***Rejected***

Remarks: * *See Annex 1.1 of Appendix 1*

** HK *and* **SG** *represent the results of Hong Kong's and* ***Shanghai's*** *surveys, respectively.*

The competitiveness of many businesses has been eroded by such factors as escalating production and operations costs, lack of competent workforce, and unfavourable industrial infrastructure. Therefore, operational strengths (in particular, the costs of production and operations, and workforce skills and abilities) would affect the adoption of reactive strategies. Evidence shows that many Hong Kong manufacturers have taken the easy route of

migrating to southern China and neighbouring regions in search of workforce and lower production and operations costs. In Shanghai, fragmented land usage has resulted in duplication and inefficient transport in the old part of the city, Puxi. Responding to this, many organisations have shifted from Puxi to the newly opened Pudong with better support of industrial infrastructure. Both Hong Kong and Shanghai respondents were rather conservative towards the impact of operational strengths on the formulation of proactive manufacturing strategies. For instance, many Hong Kong companies would adopt a lower risk strategy of seeking out original equipment manufacturing (OEM) contracts without taking into account of their operational strengths. Many Shanghai organisations, particularly those state-owned enterprises and independent organisations have evolved behind protectionist barriers. They have not taken well to seeking their operational strengths and negotiating for their own inputs. As a result, the effects of operational strengths on their proactive manufacturing strategy choices were not significant.

6.6 Discussions and Concluding Remarks

In matching the changing demands of business environments, a sound strategy formulation helps manufacturing enterprises to compete for survival and growth. The adoption of 'reactive/proactive' manufacturing strategies significantly depends on the identification of key strategy determinants. The first stage of empirical surveys contributes to the identification of common success factors and problem areas that help manufacturers determine their strategy choices in Hong Kong and Shanghai. Based on the valid responses

of 232 Hong Kong firms and 85 Shanghai firms, the surveys have drawn several conclusions as follows:

- Hong Kong and Shanghai respondents shared a similar focus on common success factors and prioritised problems in business operations. Their most common success factors identified were product and service quality, customer services, cost of production and operations, company's reputation, company's strategies and market share. Their prioritised problems were keen local competition, increasing production costs, strong overseas competitors, and insufficient R&D.
- Using the size of the company for additional analysis permitted more comparisons from the survey findings in Hong Kong and Shanghai. It shows that the size of company was related to both common success factors and problem areas, and the findings in the SME group coincided with that of large company group. The findings verified the two propositions, namely manufacturing firms would *assess their success factors with similar focus*, and *encounter similar business and operational problems, irrespective of their size.*
- Both Shanghai and Hong Kong respondents shared their preferences on manufacturing strategy choices, including market development, new product development, product modification, importing technologies, staff education and training, importing technology and strengthening R&D. Hong Kong organisations considered the improvement of product/service quality as the most important means for attaining manufacturing competitiveness, whereas Shanghai organisations stressed the importing of technologies as the first priority among the preferred strategy choices.

- A vast majority of respondents agreed with the adoption of the most preferred strategy choices irrespective of the size of companies in both cities. The third proposition, *manufacturing firms determine strategy choices with respect to their success factors and the problems encountered*, was accepted. However, it shows that the listed strategy choices were in more widespread use amongst larger companies than amongst SMEs.
- Both Hong Kong and Shanghai groups considered marketing strengths as the top priority amongst the four strategy determinants. The components of strategy determinants priortised were product and services quality, company's reputation, and costs of production and operations. Shanghai respondents stressed R&D and innovation capabilities, while Hong Kong respondents opted to the importance of management commitment.
- The results of hypothesis tests verified that there were causal links between four strategy determinants (i.e. corporate, marketing, technology, and operational strengths) and the determination of strategy choices. Two hypotheses (i.e. H1 and H2) were proven valid, indicating that both corporate strengths and marketing strengths would affect strategy choices of manufacturing enterprises. Another two hypotheses (i.e. H3 and H4) were partly accepted because there was no strong statistical evidence found with $H3_b$ (i.e. technology strengths versus proactive strategies) for Hong Kong group and $H4_b$ (i.e. operational strengths versus proactive strategies) for both Hong Kong and Shanghai groups.

Many recent studies (e.g. Berger and Lester (1997), Enright *et al.* (1997), and

HKTDC (1998, 2000)) postulated that Hong Kong's past success has been achieved by the hard work and initiative of its people and through the confidence that the rest of the world places in the territory. Shanghai being one of leaders of both manufacturing and service industries in China, has experienced rapid development and has been moving towards the adaptation of a socialist market economy since the Open Door Policy in 1978 (Yusuf and Wu, 1997). Manufacturing enterprises in Hong Kong, Shanghai or elsewhere are unique with distinctive biographies, strengths and opportunities. Presently, many manufacturing companies in both cities are leaning towards more technology-advanced and service-oriented enterprises. Evidence shows that manufacturers who can manage strategy formulation and execution effectively with performance measures will find themselves in a more advantageous position vis-à-vis their competitors.

Since the overall global business environment has been changing, the strategic responses to it have changed, in an effort to foster enterprise control and performance. A consistent feature noticeable in successful organisations tends to be that short-term decisions are taken in the context of consistent, carefully thought out long-term organisational strategies (Mintzberg, *et al.*, 1998; Porter, 1998). Energising strategy formulation practice can help manufacturing enterprises determine their corporate directions (e.g. cost leadership, strategic alliance, and technological advancement), and establish a strong link between selected strategies and enhanced performance.

This chapter discusses the strategy formulation practice and considerations in manufacturing enterprises, drawing upon an analysis of comparative survey findings in Hong Kong and Shanghai. A breadth of practitioners' opinions regarding the identification of

success factors, problems, and manufacturing strategy choices is presented. It examines the hypothesised links between strategy determinants and strategy choices in manufacturing enterprises. The results provide a number of potentially fruitful avenues for integrating strategy formulation with performance measures that will be addressed in the subsequent interviews.

Chapter 7

Analysis of Empirical Findings: Stage II - Linking Strategy Formulation with Performance Measures

7.1 Introduction

Many authors (e.g. see Dixon *et al.*, 1990, Hudson *et al.*, 2001; Kaplan and Norton, 1996; Neely *et al.*, 1996) argue that performance measurement is an important means to evaluate the effectiveness of strategy choices. Manufacturing competence varies from one industry sector to another and from enterprises of different business nature. The competitive environments and priorities also change over time. There is a pressing need for manufacturing enterprises to identify their strategy determinants and performance criteria, and search for feasible approaches that help align their strategy formulation with performance measures. The empirical interviews in the second stage was to investigate the integration initiative of manufacturing strategy formulation practice with performance measurement drawing upon the experience from practitioners, industry award winners, experts and government officials in Hong Kong. This chapter presents the interview findings on identification of key strategy determinants and performance criteria and a synthesis of strategy formulation and performance measurement in manufacturing sectors. It discusses the implications of devising an integration approach for strategy formulation and performance measures for manufacturing enterprises.

7.2 Highlights of Empirical Interviews

Two series of personal interviews were conducted. For the first interviews, forty organisations were selected from 232 Hong Kong respondent companies in the survey using a quota sampling method. Using the AHP methodology (as explained in Sub-section 5.5.1 of *Chapter Five* and *Appendix 2*), the first series of interviews acquired participants' (including senior executives and representatives) views on a set of attributes regarding strategy formulation and performance measures in their organisations. The respondents were asked to compare the relative importance amongst a given list of decision criteria, benefits and sub-elements. All replies were categorised, and the data and information acquired were gone through the coding and the computations using the computer software, Expert Choice.

The second interviews were a series of personal inquiries made with the senior executives of four selected organisations, which had participated in the first interviews. These organisations were either the past winners or certificate of merit holders of the Hong Kong Award for Industry in recent years. Four industry experts and representatives from government departments were also invited to provide further insights on performance measures in the manufacturing sectors. The main purposes of the second interviews were to reaffirm the participants' intent regarding 1) the prioritisation of strategy choices, 2) the verification of the strategy determinants and performance criteria, 3) the integration of strategy choices with performance measures, and 4) the implications on internal business conditions and industry comparison. The interviews focused on acquiring cross-fertilisation and sharing of participants' views and opinions about strategy formulation and performance

measures in manufacturing enterprises.

7.3 Findings of the First Series Interviews

7.3.1 Response rates and company profile

In total, 26 interviews were successfully conducted with 40 selected organisations, yielding a 65 percent of response rate. The profile of these participating companies is summarised in table 44. These include eight manufacturing services companies and eighteen organisations from electronics (and related products), textile/clothing, and other manufacturing sectors in Hong Kong. Fourteen enterprises (i.e. about 54%) are classified as large companies and the rest are SMEs (i.e. 46%). Similar to that of empirical survey results, sixteen companies (i.e. about 62%) are of local; and the rest are either overseas owned or in joint ownership with foreign or Chinese capital. A vast majority of the participating organisations (i.e. about 77%) have established their businesses for more than five years and almost all large organisations (i.e. 12 out of 14) for more than ten years. Twenty-four companies (i.e. about 92%) have their production plants and/or subsidiaries or representative offices in Mainland China. Seventeen respondents (i.e. 65%) are senior executives (e.g. the CEO, directors and chief consultants) of their organisations and the others include four manufacturing or production managers (i.e. 15%), three customer service managers (i.e. 12%), and two quality managers (i.e. 8%). These personnel are responsible for and/or involved in strategy formulation and performance measures in their

organisations. Their views provide a wide spectrum of experience and expertise across various industry sectors.

Table 44. The profile of participating organisations in the first interviews

Company and Respondent Profiles	Manufacturing Services	Electronic	Textile/ Clothing	Other Sectors	Total:
Size of Organisations:					
Large Organisations	3	4	5	2	14 (53.8%)
SMEs	5	2	1	4	12 (46.2%)
Total:	8 (30.7%)	6 (23.1%)	6 (23.1%)	6 (23.1%)	26 (100%)
Capital Ownership:					
Local Ownership	5	3	5	3	16 (61.5%)
Joint Venture or Foreign Capital	3	3	1	3	10 (38.5%)
Total:	8 (30.7%)	6 (23.1%)	6 (23.1%)	6 (23.1%)	26 (100%)
Years of Establishment:					
Less than 5 years	3	1	0	3	7 (26.9%)
5-10 years	2	1	1	1	5 (19.2%)
More than 10 years	3	4	5	2	14 (53.8%)
Total:	8 (30.7%)	6 (23.1%)	6 (23.1%)	6 (23.1%)	26 (100%)
Have Plants/Subsidiaries or Offices in China:					
Yes	7	6	5	6	24 (92.3%)
No	1	0	1	0	2 (7.7%)
Total:	8 (30.7%)	6 (23.1%)	6 (23.1%)	6 (23.1%)	26 (100%)
Position of Respondents:					
Senior Executives (e.g. CEOs, Directors, Senior Consultants, etc)	7	3	4	3	17 (65.4%)
Production/Manufacturing Managers	0	2	1	1	4 (15.4%)
Others (e.g. Customer Service Managers and Quality Managers)	1	1	1	2	5 (19.2%)
Total:	8 (30.7%)	6 (23.1%)	6 (23.1%)	6 (23.1%)	26 (100%)

7.3.2 Priorities among the criteria of SF and PM

The first series of interviews developed a list of four decision criteria, twenty sub-criteria and four benefit elements for strategy formulation and performance measures. These decision criteria and its sub-elements incorporated the common success factors and strategic components identified in the empirical survey (see Sub-sections 6.4.2 and 6.5.1 of *Chapter Six*). In order to prioritise the criteria decision criteria and its sub-elements, individual evaluators (i.e. the interviewed executives or representatives) were asked to make a pair-wise comparison judgement amongst them using the AHP methodology. Two groups of participants including 14 large companies and 12 SMEs involved in the first interviews. The pairwise comparison data were organised in the form of a matrix and were summarised on the basis of Saaty's (1994a, b) eigenvector procedure. The absolute weights were then used to determine the relative priorities of these decision criteria, sub-criteria and benefits. The pairwise comparison data were translated into the absolute values by solving the following matrix equation (see also *Appendix 2*):

$$A * Aw = k * Aw$$

Where, A = the pairwise comparisons matrix;

Aw = the vector of the absolute values;

k = the highest of the eigenvalues of the matrix A

The eigenvector method is a simple averaging process by which the final weights w are computed as the average of all possible ways of comparing the alternatives. Thus, the eigenvector is a 'natural' method for computing the weights (Saaty, 1994a,b, 1996). The eigenvector method yields a natural measure for inconsistency. According to Saaty

(1994b), critical ratio (CR) is a measure of how a given matrix compares to a purely random matrix in terms of their critical index. A value of the CR $\leq$ 0.10 is typically acceptable, but at larger values, the decision maker must reduce the inconsistency by revising judgments.

With the aid of AHP-computer software, both local priorities (i.e. relative to the parent elements) and global priorities (i.e. relative to the goal) were generated, and the CRs for various decision matrices were computed. Tables 45-47 present the paired comparison data and the absolute weights of the combined judgements of participants regarding the decision criteria, sub-criteria and benefit elements for strategy formulation and performance measures, respectively. The CRs ranged from 0.03 to 0.09, which fell within the acceptable level of 0.10 as recommended by Saaty (1996). This shows that both large organisation and SME evaluators have a positive view and assigned their weights consistently on the examination of the priorities of decision criteria on evaluating the integration of manufacturing strategy formulation and performance measurement in their organisations.

Table 45. The pairwise comparison judgements and the absolute weights of criteria*

SF/PM Criteria	LC	RO	MP	PD	CI	Absolute Weights
LC	1	0.4	0.9	1.1	1.2	0.172
RO	2.3	1	3.2	0.7	1.1	0.269
MP	1.1	0.3	1	0.4	0.4	0.106
PD	0.9	1.4	2.3	1	0.8	0.227
CI	0.8	0.9	2.8	1.2	1	0.225
						CR = 0.08

**Remarks: LC: Leadership and Constancy; RO: Result Orientation; MP: Management by Process; PD: People Development; CI: Continuous Improvement*

Table 46. The pairwise comparison judgements and the absolute weights of sub-criteria

a) Under Leadership and Constancy

Sub-criteria*	COM	MIN	MAC	SPD	Absolute Weights
COM	1	0.3	0.3	0.5	0.104
MIN	2.9	1	0.3	0.8	0.205
MAC	3.6	2.9	1	2.4	0.479
SPD	1.8	1.3	0.4	1	0.212
					CR = 0.06

**Remarks: COM: Corporate Mission, Vision and Values; MIN: Management Involvement; MAC: Management Commitment; SPD: Strategy and Policy Development*

b) Under Result Orientation

Sub-criteria*	CUR	FIR	NFR	OEF	SOR	Absolute Weights
CUR	1	1.5	2.4	1.5	1.6	0.290
FIR	0.7	1	2.3	1.8	1.8	0.260
NFR	0.4	0.4	1	0.4	0.8	0.108
OEF	0.7	0.5	2.2	1	0.8	0.176
SOR	0.6	0.6	1.3	1.2	1	0.166
						CR = 0.09

**Remarks: CUR: Customer Focus; FIR: Financial Results; NFR: Non-financial Results; OEF: Organisational Efficiency and Effectiveness; SOR: Social Responsibilities*

c) Under Management by Process

Sub-criteria*	PSP	SIN	SKN	ISP	Absolute Weights
PSP	1	1.6	1.5	0.4	0.244
SIN	0.6	1	0.8	0.9	0.191
SKN	0.7	1.3	1	1.4	0.255
ISP	2.6	1.1	0.7	1	0.310
					CR = 0.07

**Remarks: PSP: Product and Service Processes; SIN: Sharing of Information; SKN: Sharing of Knowledge; ISP: Implementation of Strategy and Policy*

d) Under People Development

Sub-criteria*	ETD	PWS	PIN	PEM	Absolute Weights
ETD	1	0.5	0.7	0.5	0.147
PWS	2.0	1	2.7	1.1	0.370
PIN	1.5	0.4	1	0.8	0.191
PEM	2.1	0.9	1.3	1	0.292
					CR = 0.07

**Remarks: ETD: People Education, Training and Development; PWS: People Well-being and Satisfaction; PIN: People Involvement; PEM: People Empowerment*

Table 46. *(continued)*

e) Under Continuous Improvement

Sub-criteria*	LEC	COI	RUS	BSN	Absolute Weights
LEC	1	1.1	1.2	0.7	0.239
COI	0.9	1	1.0	1.2	0.256
RUS	0.8	1.0	1	0.6	0.209
BSN	1.5	0.9	1.6	1	0.296
					CR = 0.03

**Remarks: LEC: Learning Culture; COI: Continuous Innovation; RUS: Review and Update of Strategy/Policy; BSN: Balancing and Satisfying Stakeholders' Needs*

Table 47. The pairwise comparison judgements and the absolute weights of benefits*

Anticipated Benefits	OVO	IEE	ECI	SLM	Absolute Weights
OVO	1	0.7	0.8	1.0	0.206
IEE	1.4	1	1.1	1.5	0.295
ECI	1.3	0.9	1	2.8	0.329
SLM	1.0	0.7	0.4	1	0.170
					CR = 0.03

**Remarks: OVO: Optimise Value-added Operations; IEE: Improving Efficiency and Effectiveness; ECI: Enhancing Corporate Image; SLM: Strengthening Loyalty and Morale*

For both large organisation and SME groups, the paired comparison data were processed and the absolute weights were computed in the same fashion as that of combined judgements. The overall CR was 0.05 for the large organisation group, and 0.08 for the SME group, respectively. A value of the CR ≤ 0.1 is typically acceptable, but at larger values, the decision maker must reduce the inconsistency by revising judgments (Saaty, 1994a). Table 48 summarises the normalised weights of judgements from the large organisation group, the SME group, and the combined judgements.

Table 48. Normalised weights of judgements from evaluator groups

Level 1: Decision Criteria	***Large Org'n. Group***	***SME Group***	***Combined Judgements***
Leadership and Constancy (LC)	0.197	0.143	0.172
Results Orientation (RO)	0.230	**0.305**	**0.269**
Management by Process (MP)	0.127	0.081	0.106
People Development (PD)	0.167	0.290	0.227
Continuous Improvement (CM)	**0.278**	0.180	0.225
Level 2: Sub-criteria			
	LC	*LC*	*LC*
Corporate Mission (COM)	0.102	0.099	0.104
Management Involvement (MIN)	0.127	0.315	0.205
Management Commitment (MAC)	**0.542**	**0.394**	**0.479**
Strategy and Policy Development (SPD)	0.229	0.192	0.212
	RO	*RO*	*RO*
Customer Focus (CUR)	**0.298**	**0.269**	**0.290**
Financial Results (FIR)	0.262	0.221	0.260
Non-financial Results (NFR)	0.091	0.129	0.108
Organisational Effectiveness (OEF)	0.116	0.252	0.176
Social Responsibilities (SOR)	0.234	0.129	0.166
	MP	*MP*	*MP*
Product and Service Processes (PSP)	0.165	**0.343**	0.244
Sharing of Information (SIN)	0.137	0.241	0.191
Sharing of Knowledge (SKN)	**0.365**	0.157	**0.255**
Implementation of Strategy and Policy (ISP)	0.333	0.258	0.310
	PD	*PD*	*PD*
Education, Training and Development (ETD)	0.133	0.160	0.147
People Well-being and Satisfaction (PWS)	0.312	**0.416**	**0.370**
People Involvement (PIN)	0.155	0.224	0.191
People Empowerment (PEM)	**0.400**	0.199	0.292
	CM	*CM*	*CM*
Learning Culture (LEC)	0.225	0.221	0.239
Continuous Innovation (COI)	**0.275**	0.231	0.256
Review and Update of Strategy/Policy (RUS)	0.197	0.225	0.209
Balancing and Satisfying Needs (BSN)	0.273	**0.323**	**0.296**
Level 3: Anticipated Benefits			
Optimise Value-added Operations (OVO)	0.229	0.179	0.206
Improve Efficiency and Effectiveness (IEE)	0.193	**0.360**	0.295
Enhance Corporate Image (ECM)	**0.455**	0.220	**0.329**
Strengthen Loyalty and Morale (SLM)	0.124	0.241	0.170

Remarks: 1) Priority score: i.e. 0.000 = the least significant; 1.000 = the most significant

*2) Figures in **bold** are of the highest score with respect to corresponding criteria, sub-criteria and benefits*

7.3.3 Level 1 of decision criteria

In examining the normalised priority weights of decision criteria in level 1 (see tables 45 and 48), evaluators of large organisation group considered *continuous improvement* (i.e. with normalised weight, CM = 0.278) to be the leading criterion followed by *results orientation* (i.e. RO = 0.230) and *leadership and constancy* (i.e. LC = 0.197). The SME group has a slightly different view on the importance of these criteria, they considered *results orientation* (i.e. RO = 0.305) to be the most significant decision criterion. *People development* (i.e. PD = 0.227) and *continuous improvement* (i.e. CM = 0.225) followed in the second and third places, respectively. The results coincided with the combined judgements, that is, the prioritised criteria were RO (= 0.269), PD (= 0.227) and CM (= 0.225). Many evaluators stressed the importance of results orientation (e.g. customer focus, financial results and social responsibilities) and continuous improvement (e.g. innovation, balancing and satisfying corporate needs) on the direction of the organisations.

In particular, the large organisation group realised that the leadership and constancy of purposes could drive both strategy formulation and performance measures in their companies. The SME group stressed the people development aspects that facilitated people education, involvement and empowerment with respect to promote the results orientation and continuous process for strategy execution and performance improvement. Nevertheless, many evaluators considered the *management by process* (MP) criteria to be less critical when compared to the other three criteria. The normalised weights obtained from the large organisation group, the SME group and the combined judgement were

0.127, 0.081 and 0.106, respectively.

7.3.4 Level 2 of decision sub-criteria

Under individual decision criteria, the relative importance (that is, in terms of local normalised priority weights) of the sub-criteria in the second level is computed (see tables 46 and 48). For the large organisation group, the leading sub-criteria were *management commitment* (i.e. MAC = 0.542), *people empowerment* (i.e. PEM = 0.400), *sharing of knowledge* (i.e. SKN = 0.365), *customer focus* (i.e. CUR = 0.298), and *continuous innovation* (i.e. COI = 0.275), corresponding to their parent decision criteria. With regard to the considerations of the SME group, they were *people well-being and satisfaction* (i.e. PWS = 0.416), *management commitment* (i.e. MAC = 0.394), *product and service processes* (i.e. PSP = 0.343), *balancing and satisfying needs* (i.e. BSN = 0.323), and *customer focus* (i.e. CUR = 0.269). While combining the judgements of both groups, the leading sub-criteria were MAC (= 0.479), PWS (= 0.370), BSN (= 0.296), CUR (= 0.290), and SKN (= 0.255).

The rankings of normalised priorities among sub-criteria coincided with that of the global priorities relative to the integration goal of strategy formulation and performance measures as shown in table 49. It was found that *financial results* (FIN) were included whereas *sharing of knowledge* (SKN) was not. The prioritised sub-criteria were PWS (= 0.084), MAC (= 0.083), FIN (= 0.71), CUR (= 0.070) and BSN (= 0.067).

Table 49. Global priority of sub-criteria relative to the goal of SF/PM integration

Large Organisation Group			SME Group			Combined Judgements		
Rank	Sub-criteria	GW*	Rank	Sub-criteria	GW*	Rank	Sub-criteria	GW*
1	Management Commitment (MAC)	**0.107**	1	People Well-being/Satisfaction (PWS)	**0.121**	1	People Well-being/Satisfaction (PWS)	**0.084**
2	Continuous Innovation (COI)	**0.077**	2	Customer Focus (CUR)	**0.082**	2	Management Commitment (MAC)	**0.083**
3	Balancing/Satisfying Needs (BSN)	**0.076**	3	Organisational Effectiveness (OEF)	**0.077**	3	Financial Results (FIR)	**0.071**
4	Learning Culture (LEC)	**0.071**	4	Financial Results (FIR)	**0.068**	4	Customer Focus (CUR)	**0.070**
5	Customer Focus (CUR)	**0.069**	5	People Involvement (PIN)	**0.068**	5	Balancing/Satisfying Needs (BSN)	**0.067**
6	People Empowerment (PEM)	0.067	6	Balancing/Satisfying Needs (BSN)	0.058	6	People Empowerment (PEM)	0.066
7	Financial Results (FIR)	0.060	7	People Empowerment (PEM)	0.058	7	Continuous Innovation (COI)	0.058
8	Review/Update of Strategy (RUS)	0.055	8	Management Commitment (MAC)	0.056	8	Learning Culture (LEC)	0.054
9	Social Responsibilities (SOR)	0.054	9	Education, Training & Development (ETD)	0.046	9	Review/Update of Strategy (RUS)	0.047
10	People Well-being/Satisfaction (PWS)	0.052	10	Management Involvement (MIN)	0.045	10	Organisational Effectiveness (OEF)	0.047
11	Sharing of Knowledge (SKN)	0.046	11	Continuous Innovation (COI)	0.042	11	Social Responsibilities (SOR)	0.045
12	Strategy/Policy Development (SPD)	0.045	12	Review/Update of Strategy (RUS)	0.041	12	People Involvement (PIN)	0.043
13	Implementation of Strategy/Policy (ISP)	0.042	13	Learning Culture (LEC)	0.040	13	Strategy/Policy Development (SPD)	0.037
14	Organisational Effectiveness (OEF)	0.027	14	Social Responsibilities (SOR)	0.039	14	Management Involvement (MIN)	0.035
15	People Involvement (PIN)	0.026	15	Non-financial Results (NFR)	0.039	15	Implementation of Strategy/Policy (ISP)	0.033
16	Management Involvement (MIN)	0.025	16	Product/Service Processes (PSP)	0.028	16	Education, Training & Development (ETD)	0.033
17	Education, Training & Development (ETD)	0.022	17	Strategy/Policy Development (SPD)	0.028	17	Non-financial Results (NFR)	0.029
18	Non-financial Results (NFR)	0.021	18	Implementation of Strategy/Policy (ISP)	0.021	18	Sharing of Knowledge (SKN)	0.027
19	Product/Service Processes (PSP)	0.021	19	Sharing of Information (SIN)	0.020	19	Product/Service Processes (PSP)	0.026
20	Corporate Mission (COM)	0.020	20	Corporate Mission (COM)	0.014	20	Sharing of Information (SIN)	0.020
21	Sharing of Information (SIN)	0.017	21	Sharing of Knowledge (SKN)	0.013	21	Corporate Mission (COM)	0.018
	Total:	**1.000**		**Total:**	**1.000**		**Total:**	**1.000**

Remarks*: GW stands for the global weights that are determined based on the priority scores *(i.e. 0.000 = the least significant; **1.000** = the most significant)*

While considering the global priority weights of sub-criteria in individual evaluator groups, there were different views on the relative weights and rankings among the sub-criteria. Large organisation evaluators considered MAC (i.e. 0.107) to be the leading sub-criteria, whereas the SME group considered PWS (= 0.121) to be the leading sub-criteria. In addition, other sub-criteria were emerged including *learning culture* (LEC), *organisational effectiveness* (OEF), *financial results* (FIN) and *people involvement* (PIN). The large organisation group also stressed the importance of COI (= 0.077), BSN (= 0.076), LEC (= 0.071) and CUR (= 0.069). On the other hand, the SME group looked into the needs of CUR (=0.082), OEF (=0.077), FIR (=0.068) and PIN (=0.065). Furthermore, the combined judgements also shown that both evaluator groups considered the reliance of *corporate mission* (i.e. COM = 0.018), *sharing of information* (i.e. SIN = 0.020), *product and service processes* (i.e. PSP = 0.026), *sharing of knowledge* (i.e. SKN = 0.027), and *non-financial results* (i.e. NFR = 0.029) as generally less dominating sub-criteria when compared to others in promoting the integration of manufacturing strategy formulation and performance measurement in their organisations.

7.3.5 Level 3 of benefits of SF/PM integration

The AHP analysis shows that the ranked priorities of the integration benefits were different in both evaluator groups (see Tables 47 and 48). The large organisation group placed strong emphasis on *enhancing corporate image* (ECM). Its relative importance was about two times that of optimising value-added operations (i.e. OVO = 0.455/0.229)), 2.4

times that of improving efficiency and effectiveness (i.e. IEE = 0.455/0.193), and 3.7 times that of strengthening of loyalty and morale (i.e. SLM = 0.455/0.124). The SME group considered IEE (= 0.36) as the most important benefit, followed by SLM (= 0.241), ECM (= 0.220) and VOV (= 0.179). While combining the judgements from both groups, the ranking of ECM (= 0.329) was found to be the most important benefit. The benefits of IEE (= 0.295) and OVO (= 0.206) were second and third, respectively.

7.3.6 Commentary on the first series interview findings

The AHP analysis can help the respondents to accommodate both objective and subjective judgements in order to make trade-offs and to determine priorities among the criteria (Saaty 1994a, 1996). It is likely to be more reliable than other conventional rating methods because it is able to prevent respondents from responding arbitrarily by employing the consistency test. Specifically, the consistency test validates the utility of data by means of matrix computation. In summary, the interview findings show that *results orientation*, *people involvement* and *continuous improvement* are the leading decision criteria. Promoting *people well-being and satisfaction*, *management commitment*, *financial results*, and *customer focus* were found to be the dominating sub-factors for strategy formulation and performance measures in manufacturing enterprises irrespective of their size. The integration of their capabilities can bring the benefits from *enhancing corporate image*, *improving efficiency and effectiveness*, and *optimising value-added operations* in manufacturing enterprises. The results prioritise the key strategy determinants and performance criteria, and verify their focuses on determining the performance of

manufacturing enterprises.

Some criteria are essentially directed towards the performance measures internally, according to the views of managers and employees, while others require the performance to be assessed from the perspective of external stakeholders, such as customers, suppliers, institutions and the society. The findings of the AHP analysis serve as the reference for 1) the design and conduct of the subsequent interviews and 2) the development of a generic integration model of SF/PM. In particular, the normalised weightings of industry practitioners' judgements provide an empirical base for devising a scoring mechanism for self-assessment on these criteria and sub-elements in manufacturing enterprises. The analytical framework developed can be modified for conducting similar studies in industry with different business needs and constraints.

7.4 Findings of the Second Series Interviews

7.4.1 Profile of interviewed organisations

Based on the findings from AHP analysis, the second series interviews investigated the integration initiative of strategy formulation and performance measures in manufacturing enterprises. Two specific groups of organisations were selected and senior executives and/or representatives were interviewed. The first group has four Hong Kong companies, including ASM Assembly Automation Limited, Moulin International Holdings Limited, Elec & Eltek Multilayer PCB Limited, and Chinetek Analytical System Limited.

These companies were chosen because they were either the winners or certificate of merit holders of the Hong Kong Award for Industry in recent years. They were participants of both the previous empirical survey and the first interviews, and therefore were invited to participate in the second series interviews.

Three participants were large companies and had their production plants and/or subsidiaries in Mainland China. One of them was a public-listed company in the Hong Kong's stock market. The fourth one was a SME with only eight people at the time of interview. The company had no branch and subsidiary, and relied largely on outside vendors to support its manufacturing function. A brief profile of these organisations is depicted in table 50.

Table 50. The profile of the first group of interviewed companies

Profiles	**Company A**	**Company B**	**Company C**	**Company D**
Nature of company:	Large international company	International company	Hong Kong base company	Small and medium-sized enterprise
Number of employees:	About 2,000 employees in Hong Kong	200 employees in Hong Kong and 4,600 employees around the world	Some 450 employees in Hong Kong and 6,000 in China and Thailand	Eight full-time employees
Principle products:	Integrated circuit assembly machines	Spectacle frames and associated products	Computer circuit board (multi-layer PCB)	Electronic optical equipment
Manufacturing Operations:	Have production facilities in Hong Kong, China and other countries	Have production facilities in Hong Kong, China and other countries	Hong Kong office acts as a control office while the others responsible for manufacturing	No branches and hires outside vendors to support its manufacturing function
Position of Interviewees:	Engineering Director	Human Resources Director	Manager-Product Engineer	General Manager

These four companies covered a wide range of different business background and manufactured a wide range of products from assembly machines, computer circuit boards, and electronic optical equipment to spectacle frames and associated products. All interviewed personnel were senior personnel, including an engineering director, a human resources director, an engineering manager, and a general manager in their companies. They have involved directly in the making of management decisions and the formulation of strategies for their companies. The interviews of this group of organisations focus on the areas of determination of their strategy choices, and their strategy execution and deployment.

On the other hand, the second group of participants included the representatives from two government departments (such as the Industry and Trade Department, and the Information Technology Services Department), and another two industry experts from a learning society (i.e. Hong Kong Society for Quality) and the Department of Manufacturing Engineering and Engineering Management at City University of Hong Kong. Some basic information of this expert group is given in table 51. These industry experts hold senior positions in the respective organisations and government departments. They have substantial industry experience and/or involved in the design and implementation of performance measurement systems, consulting services and teaching performance measures for industry and public sector organisations. The interviews focused on acquiring their views on strategy determinants and performance criteria, the critical processes, obstacles and barriers of performance measures in manufacturing enterprises.

Table 51. Basic information of the second group of industry experts

Industry Experts	Representing Organisations	Position and Capabilities	Relevant Industry Experiences
E	Government Department	Industry and Trade Officer	> 15 years
F	Government Department	Senior Systems Manager	> 10 years
G	Learning Society	Past Chairman	> 20 years
H	Local University	Associate Professor	> 20 years

7.4.2 Verification of strategy choices

Personal interviews of the representatives of the first group were conducted in their offices of respective organisations. The interviews ascertained that the preferred strategies in the survey coincided with currently adopted strategies in these companies. These strategy choices included product/service quality improvement, new product development, market development, product modification, staff education and training, importing technology and strengthening R&D. All interviewees agreed that these strategies interlocked with each other in building competitive strengths for their companies. A summary of preferred strategy choices amongst interviewed companies is shown in table 52.

It was found that management commitment pushed for quality improvement and business success in these organisations. Companies A, B and C have set clear goals for continuous improvement and attained the ISO 9000 certifications, while Company D developed its own quality system that stressed the documentation control. Four award/merit holders shared their experiences on adopting a market-oriented approach to new product development and product modification. They used focus groups and marketing research, and organised seminars with customers and suppliers to identify market

needs and requirements. Three large companies have established specific product teams to look after different product lines, while the SME (i.e. Company D) relied on its project team to acquire staff efforts and allocate resources. Moreover, joint ventures, direct export, forming strategic alliance were the common approaches of these companies for market development. Companies A and B participated in overseas exhibitions to spread their product information, whereas Companies C and D used the Internet extensively to promote their products and services directly to target customers.

Table 52. The preferred strategy choices among interviewed companies

Strategy Choices	Company A	Company B	Company C	Company D
Product/Service quality improvement	Implement ISO 9001 quality management system.	Implement ISO 9001 with focusing market reports.	Implement ISO 9002, with extra quality certificate on specific areas.	Develop own quality management system.
New product development and modification	Conduct marketing research; meeting with customer; and form new product teams, and customer focus.	Conduct marketing research, establish new product teams with new product committee board, and establish ODM and build brand name.	Form new product teams, focusing on product modification according to varied business nature.	Hire outside researcher and consultants.
Market Development	Use direct exports through exhibition and other channels.	Set up branch offices, through exhibition.	Use joint venture, and organise seminars and meeting with customer.	Use direct exports through exhibition and internet.
Staff Education and Training	Set up training and development department, and provide training, subsidies and allowance.	Hire training officer, and provide training, subsidies and allowance.	Set up training and development department, and provide training, subsidies and allowance.	Stress technical training, and provide subsidies or allowances.
Importing Technology and Strengthening R&D	Build R&D teams.	Develop and train R&D staff.	Setup corporate R&D department and teams.	Work with strategic partners in the Mainland China, and hire external researcher.

Four companies have used information technology extensively to maintain flexibility while improving process efficiency and quality. Company A set up a research and development (R&D) team and conducted its own research, whereas Companies B and C stressed their product development and adopted new technologies from abroad. Company D seldom did R&D but worked with its strategic partners in the Mainland China. Four representatives agreed the role of human resource development on strengthening their company's R&D capabilities, and claimed that their organisations stressed staff education and training. Company A provided a wide range of training with focus on middle-level management staff and engineers. Company B extended its training target to personal growth of staff members. Subsidies and/or allowance were provided as a means of staff motivation in Companies C and D.

7.4.3 Comments on industry and strategy trends

The representatives of these award/merit holders (i.e. Companies A, B, C and D) shared their views on government policies and the direction of development for Hong Kong manufacturing industries. They commented that the government policies should seek to reinforce comparative advantages. As an economic intermediary between China and the rest of the world, Hong Kong has been a major beneficiary of foreign research and development. Its openness to imported capital, people, and ideas was a key success factor, and one that should be exploited and enhanced rather than eroded. Hong Kong manufacturers should become more proficient in the areas of business outside of pure manufacturing, particularly information technology, to coordinate activities in response to

the globlisation trends. Continued reliance on a narrow range of products marketed to a small group of overseas markets could make Hong Kong vulnerable; both product diversification and market diversification should be needed.

These representatives argued that the current issues presenting the greatest challenge for Hong Kong manufacturers would be the use of information technology systems (e.g. global networking, e-commerce, and cyber technologies) and compliance of quality, environmental, and safety management standard requirements. It would be important for the industry to have a continued commitment to free trade and information flows that are underpinned by market mechanisms, the rule of law, and a corruption-free civil service. Moreover, two representatives admitted that their company's strategy hinged on technology transfer from foreign investors, a talented workforce, and international connections. It would be no longer prudent to wait until market pressures force a company to seek out a new business. They also admitted that their company's future would depend significantly on how to strengthen their aggressiveness to create business opportunities.

7.4.4 Comments on strategy determinants and performance criteria

The second group of government representatives and industry experts (i.e. Organisations E, F, G and H) were asked to comment on various strategy determinants and performance criteria as identified from the first interviews. An abstract of their views and comments with regards to these determinants and criteria is shown in table 53.

Table 53. Abstracts of views and comments from industry experts and representatives

Determinants/ Criteria	Abstracts of industry experts' views and comments with regards to strategy determinants and performance criteria
Leadership and Constancy of Purposes	1. Performance measures and the measurement processes are driven by corporate mission and goals 2. Senior management leadership and commitment acts as a driver for strategy execution and deployment. 3. The critical guide and motivator for the development and implementation of performance measures must come from senior management 4. The performance measures issues are an integral part of strategy and policy development.
Results Orientation	1. Performance must be defined from the customer's viewpoint and exceeding the customer's expectations can only be accomplished when organisations strategically plan and organise their resources. 2. Companies must monitor and improve their performance based on objective measures of business and operational results 3. Performance must be based on an organisation's knowledge of its customers, overall customer service system, responsiveness, ability to meet customer requirements and expectations 4. Non-financial measures must be derived from corporate strategies and are rooted in the organisation structure and resources. 5. Performance measures must readily provide the basis for benchmark comparisons, such as internal, inter-group, competitive and process benchmarking, etc.
Management by Processes	1. Fundamental to strategy formulation is collecting relevant information from all phases of an organisation's operations and using it to monitor and improve the strategy execution and deployment 2. Performance measures stresses extensive information collection and analysis for managing information resources. 3. A measurement process with sharing of information and knowledge must be in place to communicate with customers and includes their input in strategy planning and execution. 4. Key processes must be designed, effectively managed, and improved to achieve higher performance
People Development	1. Managers have accountability for performance measurement, management and development 2. All aspects of human resource management (e.g. manpower planning, recruitment and staffing, training and development, performance appraisal and reward systems) assume strategic roles. 3. The goal of performance measures can only be obtained when there is a high level of people involvement, empowerment and commitment. 4. Teamwork and collaboration is a key to success
Continuous Improvements	1. Companies must concern with systematically deriving improvement actions from customer expectations and strategic decision through business processes, and prioritising improvement actions that will most contribute to strategic objectives 2. Assessment of performance is essential to diagnose the root causes of problems or weaknesses. 3. Manufacturers must increase their capacity to learn from their successes and failures and develop the innovation initiatives for performance improvement.

They agreed that results orientation have been dominating the conventional practices of manufacturing enterprises on strategy formulation and design of performance measures in Hong Kong. Measures on business processes and performance should be related to measures on customer satisfaction and financial performance. In particular, many enterprises stressed heavily their financial results. Both government representatives (i.e. F and G) added that customer focus and social responsibilities has become more critical for sustaining competitiveness and growth not only for manufacturing enterprises, but also for public sector organisations and government departments. The two industry experts (i.e. G and H) argued that continuous innovation was and would still be an arena for competition. Local manufacturers should act proactively to respond to customer request for quality products/services with more features. All four experts/representatives, however, shared similar views on urging manufacturing enterprises to benchmark their R&D and innovation capabilities with that of competitors.

Both industry experts added that local enterprises should ensure the deployment of their core manufacturing strategies and business strategies. Management leadership and commitment was the key driver for organisational success in various endeavours. A clear corporate mission could provide people a sense of direction to respond to the organisation's development and improvement needs. The management should examine how key processes were designed, effectively managed and improved to achieve higher performance, and should support functions that would impact operations. A dedication to empowering people to change and monitoring the progress would be critical to facilitate performance improvement.

The integration of strategy formulation and performance measures would go best when employees of all levels were treated as main stakeholders. They added that sustained competitive advantage would require learning faster and responding faster than the competition. Moreover, industry experts/representatives suggested that identifying what counts, measuring it, holding people accountable for it, coaching them to get better at it, and rewarding it were the simple, yet practice ways of performance measures in manufacturing enterprises.

The industry experts/representatives were asked to comment whether there are any other influential factors and considerations. One government representative introduced the new corporate values in his department, namely VIPS representing "Valuing people, Integrity, Professionalism and Striving for excellence"; and argued that the VIPS could equally be applicable for other public sector organisations and manufacturing enterprises. Another representative insisted that performance measures in manufacturing enterprises should encompass a portfolio of quality, speed, reliability, reputation, service and safety.

As criticised by one industry expert that the performance measures with regards to the supply chains were always neglected. It would be critical for manufacturing enterprises to involve vendors in the design process and technology and response needs of the business. Strengthening the relationships with suppliers could result in lower inventory levels and costs, and higher accuracy and turnover. Besides, the second expert argued that lean manufacturing practice was important, particularly in the areas of operations flexibility and global competition. For instance, local manufacturers should adopt time-based strategies in their operations leading to a rapid response of customer order requests and a

rapid introduction of new products. They should benchmark their operations and performance with global competitors, and develop and deploy manufacturing strategies to foster their core competencies.

7.4.5 Comments on measurement system designs

The industry experts/representatives were asked to comment on the performance measurement practices in local manufacturers and provide advice to the manufacturing sectors. They argued that many manufacturers have several common weaknesses in performance measures, including 1) too financially orientated, 2) lack the detail to make meaningful responses, and 3) too focused on the internal situation rather than the customer-competitor environment. Manufacturers usually refer their business and operations performance in terms of outcomes. In selecting performance measures, they would choose the historical ones of cost or productivity and focus largely on process outcomes using self-referenced objective data from internal sources. Industry experts suggested that 1) the development of more process input measures could prove useful; 2) the information obtained from external sources could be more relevant to an organisation's long-term success; and 3) performance on competitive priorities would best be measured both internally as a means of controlling processes and externally as a way of checking on actual outcomes from customer's perspective. The industry experts recommended a prescribed set of performance indicators for manufacturing industry. Table 54 classifies these indicators into five dimensions.

Table 54. A set of performance indicators suggested by industry experts

Dimensions	Elements of performance indicators
Production Inputs	1. Quality of purchased components (i.e. zero defects) 2. Quantity of inputs 3. Allocate budget and resources
Work Performance	1. Equipment productivity 2. Equipment failure 3. Maintenance effort 4. Cost of downtime 5. Overtime 6. Waste (e.g. percentage of defects, scrap and reworked) 7. Throughput 8. Production flexibility (e.g. set-up times) 9. Production complexity
Product and Services	1. Quantity of output 2. Quality of output (e.g. percentage of yield) 3. Safety (e.g. serious injury rate) 4. Reliability (e.g. warranty claims and costs) 5. Availability (e.g. percentage of stockouts) 6. Obsolescence (e.g. percentage of shrinkage) 7. Commitment to quality (e.g. percentage of dependence on post-inspection) 8. Cost of quality
Market	1. Market share 2. Market leadership (e.g. percentage increase in market share, new customers, etc) 3. Strengths (e.g. index of competitive value)
Employees	1. Employee skills 2. Employee morale (e.g. absenteeism, downtime, new staff/total staff, etc) 3. Employee productivity
Customers	1. Customer awareness 2. Timeliness (e.g. overdue deliveries, mean delivery rate, etc)

Industry experts/representatives added that a company has learned, for example, that customer perceptions and expectations of quality would be often very different than those people within the company. The same could be said about cost, flexibility, speed and delivery reliability. They argued that the use of self-referenced and subjective measures would often be unavoidable in manufacturing industry. While developing performance

measurement systems, companies should realise that dependence on subjective measures alone can be troublesome. Benchmarks by obtaining data from both internal and external sources (especially from customers and other external groups) could provide useful information. Therefore, local manufacturers should move towards a broader base of measures, and examine the alignments with their strategy formulation. Moreover, both industry experts and government representatives also agreed that successful integration of strategy formulation and performance measures would rest largely on the complexity of the product/process, technological, organisational and managerial choices, and performance levels reached.

7.5 Concluding Remarks

This chapter presents the key findings of two series of interviews. The first series contributes to the identification of various strategy determinants and performance criteria for manufacturing enterprises, using the AHP methodology. Evidence shows that results orientation, people involvement, and continuous improvement are the leading criteria. Promoting people well-being and satisfaction, management commitment, financial results, and customer focus are the dominant sub-criteria for integration of strategy formulation and performance measures. Senior management lead the way, whereas middle management facilitate the integration process and front-line operations follow to attain corporate objectives. The integration can bring along many benefits including enhanced corporate image, improved efficiency and effectiveness, and optimisation of value-added operations in organisations.

The findings of the second series of interviews substantiate the complementary nature of strategy formulation and performance measures. Opinions compiled from several industry practitioners, experts and representatives from government departments provide invaluable insights into formulation of organisation-wide strategies and the development of performance measures in manufacturing enterprises. In particular, the findings verify many aspects regarding manufacturing strategy choices, industry and strategy trends, strategy determinants and performance criteria, and measurement system design. Despite derived largely from the Hong Kong's industry and business environment, the empirical findings are not company specific. It is anticipated that the findings can have wider implications in generality, and offer the prospect of considerable synergy in the areas of strategy formulation and performance measures in manufacturing enterprises.

Chapter 8

Development of an Integrated Model for Manufacturing Strategy Formulation and Performance Measurement

8.1 Introduction

Empirical findings of this study suggest that manufacturing enterprises are increasingly dependent on their strategies to compete regardless of their size, nature and location. Many industry practitioners and experts realise that there is an increasing need to integrate strategy formulation with performance measures in the pursuit of continuous improvement and excellence goals. This chapter discusses this need, and describes the development of a proposed model for integrating the initiative of strategy formulation and performance measurement. It explains the essential ingredients of the model, and relates them to the self-assessment and benchmarking practices in manufacturing enterprises. Accompanying the model, a results-oriented scoring method is introduced and the development of a five-stage process framework of implementation is described for facilitating the integration efforts. Moreover, this chapter discusses the results of a post-evaluation survey that acquired industry practitioners' comments on the applicability of the model. The findings affirm that using the model can help manufacturing enterprises to amalgamate strategies and measure performance for improvement goals.

8.2 Needs for Integrating SF/PM Initiatives

There is a general agreement in the manufacturing strategy literature that the decisions regarding the structure and infrastructure of an organistion should be in line with its corporate objectives and competitive priorities such as quality, flexibility, delivery and cost (Anderson *et al.,* 1989; Hill, 1989). In order for an organisation to successfully compete on its corporate objectives and competitive priorities, relationships must exist between its strategies, actions and performance measures (Dixon *et al.*, 1990; Neely 1998). Key structural issues involve process technology and capacity, whereas key infrastructural issues include human resources, management, and organisation culture. Dangayach and Deshmukh (2001) argue that resolution of infrastructural issues is very important for an organisation to manage changes and achieve sustainable advantage. The rate of change in both the internal and external environments of manufacturing enterprises is increasing, which necessitates that increased attention be paid to strategic planning and, in particular, strategy formulation and performance measurement.

Figure 30 shows some recent thoughts regarding the general trend of changes in the business environment over the past few decades. For instance, the supply of resources was readily available in the 1970s, increasing constraints in the 1980s and became highly situational in the 1990s. The focus on national and local markets has been changing with respect to the new and different challenges of globalisation (Bean, 1993; Porter, 1998). Nowadays, market demands become highly idiosyncratic with turbulent and volatile velocity. Many manufacturing enterprises have to change their strategic focus on product, market, technology and capability toward resources-based, flexible and lean strategies (Porter, 1998; Pun, 1998). Performance measurement plays a very important part in

translating corporate strategy into results. It helps manufacturing enterprises to identify operational problems that can be solved by adjusting existing processes, and indicates more fundamental problems that require an adjustment to corporate strategies (Kennerley and Neely, 2002; Mintzberg, 1994a; Neely *et al.*, 2002).

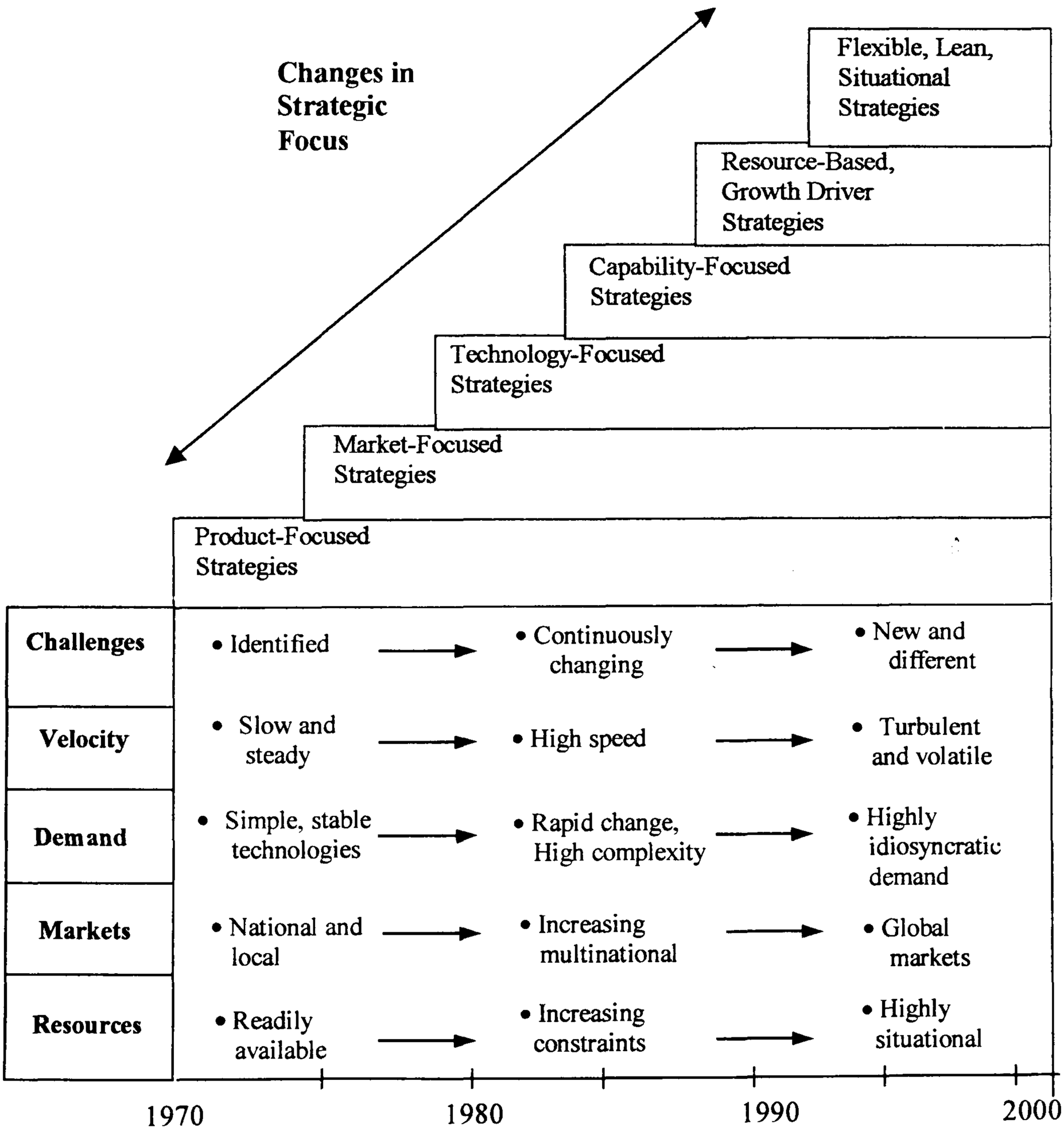

Figure 30. Manufacturing strategies with regards to changing business environment
Source: Based on Bean (1993) and Pun (1998)

Recent literature has identified various principles, criteria and attributes in connection with strategy formulation (e.g. Hax and Majluf, 1996, Mintzberg, 1994a, Strickland and Thompson, 1998) and performance measures (e.g. Kanji, 1998, 2001; Kaplan and Norton, 1992, 1996; Neely, 1998, 1999). Many practitioners and researchers have postulated different planning models, frameworks and approaches (e.g. the competitive forces model (Porter, 1980), the strategic grid (McFarlan and McKenney, 1983), the strategic alignment model (Henderson and Venkatraman, 1992), the contingency framework (Mills *et al.*, 1995), and the configuration process model (Pun *et al.*, 2000a) pertinent to strategy formulation, performance measurement and their integration. Although most of these planning models stand by themselves empirically and/or theoretically, they have constraints borne with their own application domains. In an attempt to develop a holistic paradigm, a synergy model for manufacturing strategy formulation is proposed (as discussed in Section 2.5 of *Chapter Two*). The model stresses strategy content, context and process, incorporating the key features of selected planning frameworks and methodologies. It encompasses the translation of corporate missions and objectives into organisational strategies, the implementation of strategies, and the amalgamation of plans.

On the other hand, this research investigated the design and implementation aspects of performance measurement systems with respect to the concepts of Total Quality Management and the principles of Business Excellence models (as discussed in Section 3.5 of *Chapter Three*). These concepts and principles are concerned with continuous improvement, meeting customers' requirements, reducing rework, long-range thinking, increased employee involvement and teamwork, process redesign, competitive benchmarking, constant measurement of results, and closer relationships with suppliers

(Dale, 1999; Powell, 1995). Integrating TQM concepts with performance measures becomes an imperative in the pursuit of excellence.

Identification of strategy determinants and performance criteria provides the basis for achieving the intended performance ends. However, the results rely on how manufacturing enterprises can make good use of these criteria to formulate and deploy strategies and manage performance measures. Recent studies (e.g. see Neely *et al.*, 2002; Schneier *et al.*, 1995; Waggoner *et al.* 1999) suggest performance measurement facilitates execution of business strategies by 1) signaling what to measure; 2) determining appropriate ways to measure; and 3) fixing accountability for performance on the measures. Schneier *et al.* (1995) argue that strategy execution is in jeopardy without the facilitation of performance measurement. People may focus on the wrong measures, fail to know when or agree if targets are reached, aim too low and achieve too little, and/or see no consequences for missing the targets.

Neely (1999) asserts that the changing nature of work, increasing competition, specific improvement initiatives, national and international quality awards, changing organisational roles, changing external demands, and the power of information technology constitute the need of performance measures. Schneier *et al.* (1995) argue that the importance of aligning key organisational capabilities (such as structure, skills, style and systems) with strategy is to assure implementation of performance measures. Regardless of how formally a strategy is documented, the identification of strategy determinants and performance criteria tell what must be done to win; and performance measures are needed to determine how well organisations must perform and how they will know if they succeeded.

Strategies are rarely deployed if a general mandate or vision (e.g. to compete globally) is not executed (e.g. speeding the right financial and sales data to offices all over the world simultaneously). Organisations also need to determine the speed and right data to communicate performance targets. Moreover, Schneier *et al.* (1995) add that performance measures must be implemented at the unit, team, and individual levels, and must also fix accountabilities for performance. Specific outcomes and behaviour can then be specified and linked to consequences. Many PM systems fail in facilitating strategy execution because managers have not determined what people and teams must actually do and achieve (Schneier *et al.*, 1995). PM systems must therefore be designed to drive strategy execution and deployment in organisations. The integration of strategy formulation and performance measures is reflection of the values the company has around its performance that is illustrated by action. It is also an end of strategy formulation that plays a communication role to motivate staff, and improve control and accountability mechanisms in manufacturing enterprises.

8.3 Development of a SF/PM Integration Model

8.3.1 Constructs and components of the model

The empirical study used in this research investigated the strategy determinants and performance criteria for manufacturing enterprises. The first stage surveys identified the common success factors, problem areas and strategy choices. The relationship between corporate, marketing, technology and operational strengths and the choices of 'reactive/proactive' manufacturing strategies were examined. The second stage interviews

identified the key strategy determinants and performance criteria (e.g. results orientation, people involvement, and continuous improvement) that would pave the way for potential integration of SF/PM initiatives. Several design elements and process considerations for aligning manufacturing strategy formulation with performance measures were derived. These provided the important inputs and served as a foundation for the development of a generic model for SF-PM Integration (SPI).

The proposed SPI model has five categories of criteria, including *Leadership and Constancy of purpose*, *Management by Process*, *People Development*, *Continuous Improvement,* and *Results Orientation*. They constitute several core *enablers* and *results* elements that govern the operations of the model. Leadership and constancy of purposes is the driver of the SF/PM integration that leads to the sustained pursuit of customer value and improvement in performance. If the management does not want self-assessment to occur, it will not happen. The integration of SF/PM efforts rests on systematic management by process, people development and continuous improvement to meet the customer, quality, and performance requirements. The enabler elements stress the company's human resources and key processes on fostering performance. The results-oriented measures of progress provide a basis for channelling actions to delivering continuous improvement with the aim of fostering value-added operations, improving efficiency and effectiveness, enhancing corporate image, and strengthening people's loyalty and morale. The model forms a single framework that can be integrated into the performance management system of any manufacturing enterprises and be modified to suit for other organisations in private and public sectors. A diagrammatic representation of a systems framework of the SPI model is given in figure 31.

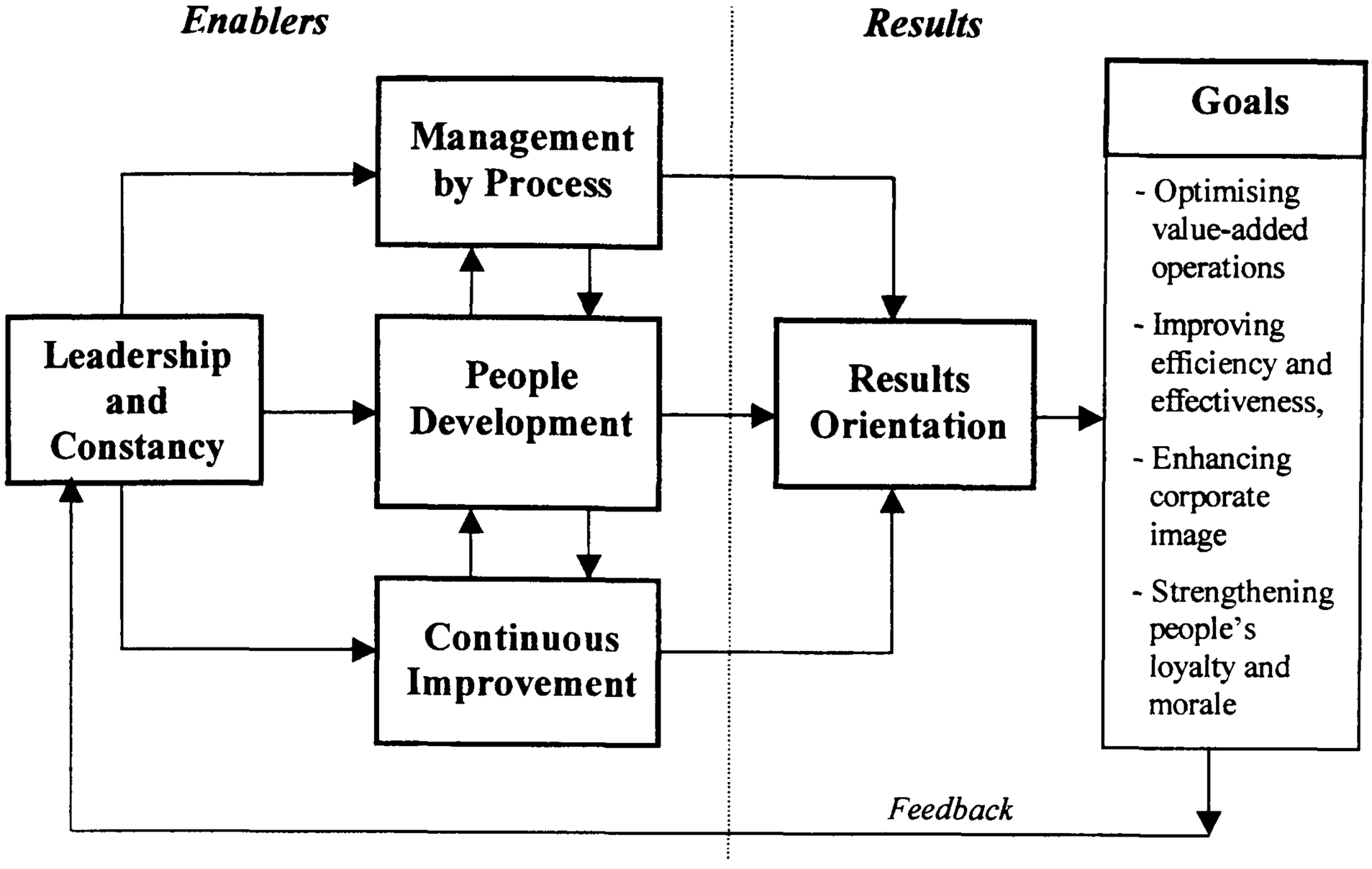

Figure 31. A systems framework of the SPI model

8.3.2 Characteristics and features of the model

There are many self-assessment tools used by organisations to measure performance. Some are survey-based, accompanied by ratings, while others could just be audit list of questions that require written answers. According to Lee and Quazi (2001), a reliable self-assessment tool for performance should satisfy two cardinal conditions. First, it should measure what it is supposed to measure, in this case, measuring all dimensions of business that are deemed to have impact on overall organisational performance. Second, it should be able to measure them correctly, in this case providing a measurement score that is credible and comparable within industry or across industries. In order to satisfy these two conditions, the SPI model applies the guiding principles embodied with the business

excellence model (e.g. MBNQA and EQA) under which the integration of manufacturing strategy formulation and performance measures can proceed.

The SPI model has twenty-one sub-criteria under five categories of SF/PM criteria, with a total score of 1,000 points as depicted in figure 32. The point values for criteria and sub-criteria were determined using the normalised weightings in the AHP analysis of empirical findings obtained from the first series of interviews. These point values were generated collectively from practitioners' perspectives in the manufacturing sectors. Explanations of how the point levels derived can be referred to Sub-sections 7.3.3 – 7.3.5 and Tables 48 and 49 of *Chapter Seven*. An item listing of criteria and sub-criteria with point values is given in table 55.

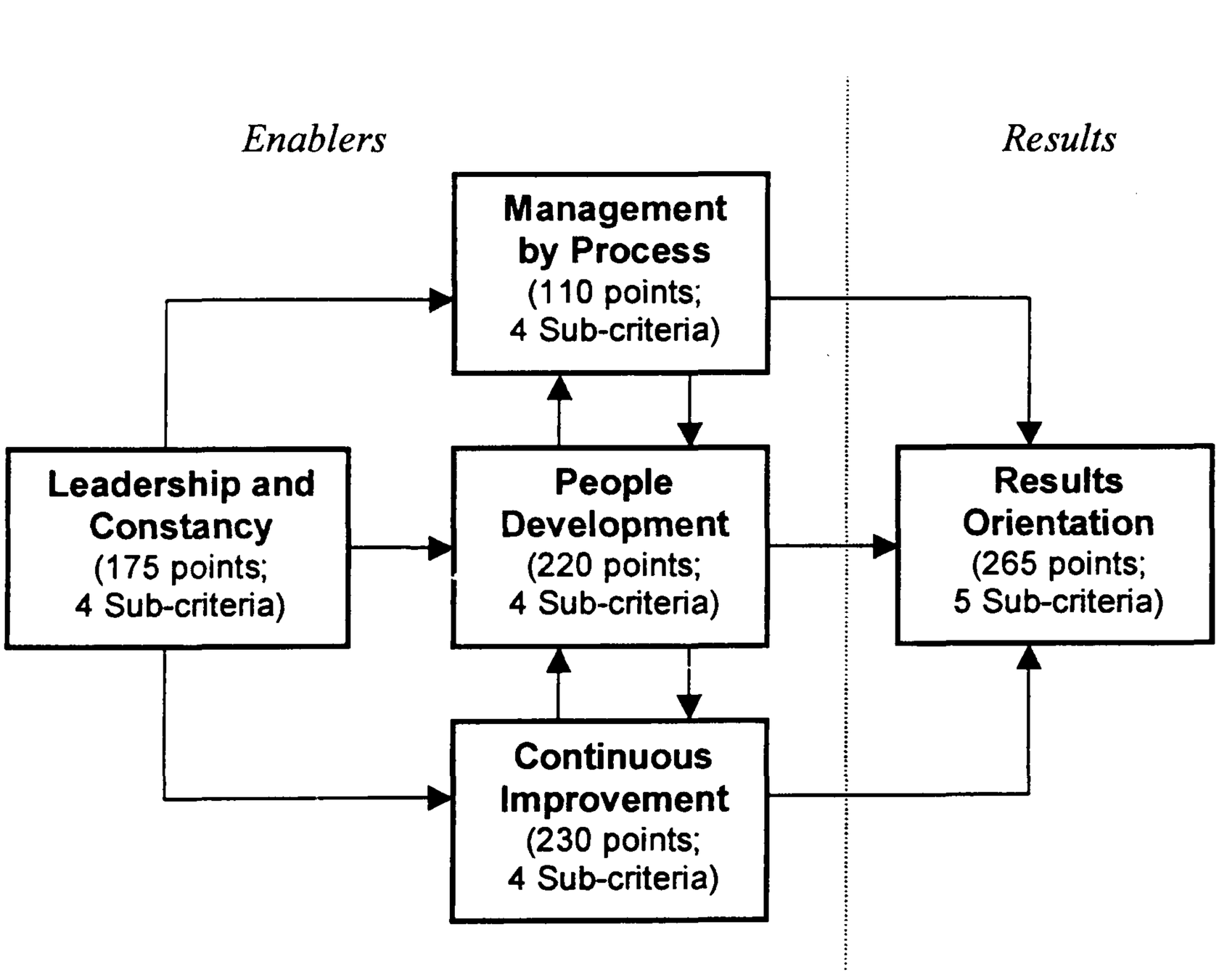

Figure 32. The construct of SPI model

Table 55. A score listing of the SF/PM criteria and sub-criteria

Category	Evaluation Criteria and Sub-criteria		Point Values*
1.	**Leadership and Constancy (LC)**		**175**
	1(a) Corporate Mission, Vision and Values (COM)	20	
	1(b) Management Involvement (MIN)	35	
	1(c) Management Commitment (MAC)	80	
	1(d) Strategy and Policy Development (SPD)	40	
2.	**Management by Process (MP)**		**110**
	2(a) Product and Service Processes (PSP)	30	
	2(b) Sharing of Information (SIN)	20	
	2(c) Sharing of Knowledge (SKN)	30	
	2(d) Implementation of Strategy and Policy (ISP)	30	
3.	**People Development and Involvement (PD)**		**220**
	3(a) People Education, Training and Development (ETD)	30	
	3(b) People Well-being and Satisfaction (PWS)	80	
	3(c) People Involvement (PIN)	40	
	3(d) People Empowerment (PEM)	70	
4.	**Continuous Improvement (CI)**		**230**
	4(a) Learning Culture (LEC)	50	
	4(b) Continuous Innovation (COI)	60	
	4(c) Review and Update of Strategy/Policy (RUS)	50	
	4(d) Balancing and Satisfying Stakeholders' Needs (BSN)	70	
5.	**Results Orientation (RO)**		**265**
	5(a) Customer Focus (CUR)	70	
	5(b) Financial Results (FIR)	70	
	5(c) Non-financial Results (NFR)	30	
	5(d) Organisational Effectiveness (OEF)	50	
	5(e) Social Responsibilities (SOR)	45	
	Total Score Points:		**1,000**

Remarks:

* *Point values based the global priority of combined judgements on corresponding sub-criteria from the first series of interview findings (see Tables 48 and 49 of Chapter Seven). The values were rounded up according to a scale of 1,000 points.*

These SF/PM criteria are designed objectively for self-assessment of organisational performance on an ongoing basis. They help users to set the predetermined evaluation requirements and the deployment of organisational resources. Self-assessment can allow users to examine dynamic relationships amongst criteria and performance. The results can serve as a communications means and as a basis for deploying consistent overall performance requirements (Shergold and Reed, 1996; Voss, 1994). By incorporating the literature and the empirical findings of this research, a summary of the requirements for these criteria are shown in tables 56 and 57.

Table 56. Criteria requirements of enabler dimensions

Criterion 1: Leadership and Constancy of Purpose (175 points) It measures the extent to which leaders... • have a mission, a vision, and short and long-term strategies. • define clearly the corporate goals. • communicate and reinforce the corporate mission, vision and values. • translate the goals into strategy, policy and implementation plans. • allocate improvement initiatives the necessary resources. • assume the management leadership and responsibility for performance. • promote the development of the human resources, invest on training and education and reward performance achievements. • promote a culture and learning and improvement in the organisation. • communicate, define and motivate improvement initiatives and efforts.	**Criterion 3: People Development and Involvement** (220 points) It measures the extent to which ... • training is given to managers and employees with the knowledge and skills needed to perform their jobs and assignments. • feedback is provided to employees on their performance. • resources and supports are available for employees to contribute effectively to meeting their career development needs, well-being and satisfaction. • the organisation uses teamwork to solve cross-functional problems and foster people participation and involvement. • managers bring people together to improve communication. • people well-being and satisfaction is safeguarded • leaders remove barriers that prevent people from improving performance. • leaders empower individuals by creating a collaborative and risk-taking and sharing environment.
Criterion 2: Management by Process (110 points) It measures the extent to which the organisation... • develops an appropriate methodology for assessing performance. • has processes that are designed to meet the corporate requirements. • determines which are the critical processes and selects adequate points of control. • applies appropriate statistical methods to control its processes. • establish effective information systems and make decisions based on objective and reliable data. • has a performance measurement system that evaluates its improvement processes. • shares the information and knowledge and disseminates findings of performance measurements to those who are involved . • compares current performance with past performance. • uses the performance measurements to improve its products and processes. • uses assessment results and benchmarking to enhance knowledge about processes. • collects a wide range of complete and accurate performance indicators that facilitate implementation of strategy and policy.	**Criterion 4: Continuous Improvement** (230 points) It measures the extent to which the organisation... • has a culture of continuous innovation and improvement. • continually searches opportunities for improvement • systematically identifies small, incremental improvement opportunities. • uses methods for determining and monitoring external and internal customer (employee) satisfaction. • handles complaints, resolves them, and uses the information gather for performance improvement. • reviews and updates strategies and policies that meet current and future customer requirements and expectations. • measures performance against customer targets and compares customer satisfaction results with those of its main competitors. • uses feedback from customers to improve its products and services. • reacts to changes in customer satisfaction indicators • encourages employee interaction with customers and suppliers. • balances and satisfies the needs of stakeholders • introduces corrective actions and monitor their effects. • has mechanisms to avoid the recurrence of problems.

Table 57. The requirements of the results-orientation criterion

Criterion 5: Resuits Orientation (265 points)	
It measures the extent to which the organisation... • has a vision, a mission and a long-term strategy • has organisation's values that reflect concerns with all stakeholders • has strategy and policy that are consistent with the stated aims and purposes • has organisation's values that foster co-operation among the stakeholders • has a healthy financial situation and strong financial performance • has high customer demand • has been able to recruit and maintain outstanding staff • achieves its goals • compares its current performance with that of competitors' and best in class • fulfils stakeholders values • has good supply chain management process • has both short term and long term strategy for every aspect of the organisation	It also measures the extent to which stakeholders feel that the organisation... • actively listens to their needs and requirements • effectively deals with complaints • regularly introduces new and innovative products and services • provides the services and products that do not have defects or other non-conformities and exhibit the stated characteristics • disseminates accurate and reliable performance indicators • provides relevant and reliable information to them • works in partnership with them • has a culture of continuous improvement and a learning attitude • uses benchmarking to improve its processes • has an ethical conduct • has a good reputation and overall image

8.3.3 Self-assessment instruments and guidelines

Any user or organisation can furnish its performance information using the self-assessment tools or instruments with respect to the four measurement cores as advocated by the European Quality Award (EFQM, 2000, 2002). These cores are Results, Approach, Deployment, and Assessment and Review. First of all, the *Results* core covers what the organisation achieves in performance. Secondly, the *Approach* core covers what the organisation plans to do and the reasons for it. This refers to how the organisation addresses the evaluation requirements, or in other words, the method(s) being used. Thirdly, the *Deployment* core covers what the organisation does to deploy the approach. This refers to the extent to which the approach is applied to individual evaluation criteria and sub-criteria. Lastly, the *Assessment and Review* core covers what the organisation

does to assess and review both the approach and the deployment of the approach. This stresses the analysis of the results achieved and monitoring of the ongoing learning activities. These four cores constitute the RADAR logic as illustrated in figure 33.

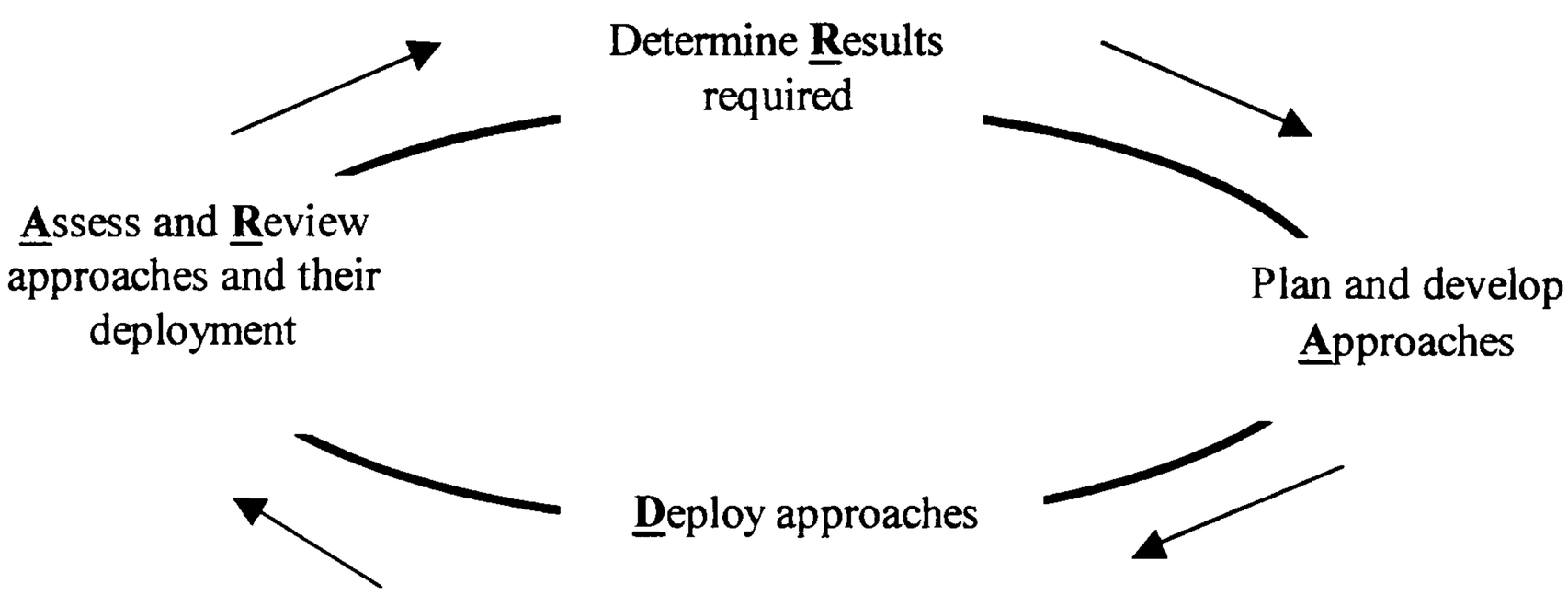

Figure 33. The RADAR logic of self-assessment
Source: Based on EFQM (2000)

Two self-assessment instruments, namely 1) the pathfinder card and 2) the scoring matrix, are employed. The pathfinder is a series of questions designed for quick answers that helps the organisation to identify improvement opportunities and build improvement plans. A sample pathfinder card is depicted in figure 34. This instrument can be used at either criterion or sub-criterion level. It serves as a pivotal tool to identify gaps and areas for performance improvement (EFQM, 2000, 2002).

I. Results
Do the results: • Cover all appropriate stakeholders? • Measure all the relevant approaches and deployment of approaches using both perception and performance indicators? • Show positive trends or sustained good performance? If yes, for how long? • Have targets? If yes, are the targets achieved? • Have comparisons with others, for example competitors, industry averages or 'best in class"? • Compare well with others? • Show a cause and effect link to approaches? • Measure balanced set of factors both for now and in the future?

II. Enablers – Approach/Deployment/Assessment and Review	
a. Approach Is the approach:	• Soundly based? • Focused on stakeholder needs? • Supporting Policy and strategy? • Linked with other appropriate approaches? • Sustainable and innovative? • Flexible and measurable?
b. Deployment Is the Deployment of the approach:	• Implemented in all potential areas across the organisation? • Implemented to its full potential and/or capability? • Achieving all the planned benefits? • Understood and accepted by all stakeholders? • Systematic and measurable?
c. Assessment and Review Is the approach and its deployment:	• Measured for effectiveness regularly? • Providing learning opportunities? • Benchmarked with others, e.g. competitors, industry averages or best in class? • Improved based on the output from learning and performance? • Measurable?

Figure 34. A sample pathfinder card for self-assessment
Source: Based on EFQM (2000)

The second and main tool is the scoring matrix. It contains a set of checklist-type questionnaire that is designed for the purposes of self-assessment and benchmarking. Since most SF/PM criteria are non-prescriptive and cannot be directly measured, they are translated into a set of performance indicators as described in tables 56 and 57. These

criteria are then converted into measuring items in the questionnaire. The items for each criterion are modeled to help users identify the focal areas and attain the anticipated outcomes with respect to the four cores, as depicted in table 58.

Table 58. Anticipated outcomes and focal areas of self-assessment

Cores	Anticipated outcomes	Focal areas
Results	The results should show positive trends and/or sustained performance. Performance measurement targets should be met or exceeded, and performance will compare well with others and will have been caused by the approaches. In addition, the scope of the results should address the relevant areas.	• Company's current performance • Performance relative to appropriate comparisons and/or benchmarks • Rate, breadth, and importance of the performance improvements • Linkage of results measures to process and action plan
Approach	A sound approach includes having a clear rationale, defined and developed processes and a clear focus on stakeholder – supporting policy and strategy and linked to other approaches where appropriate.	• Appropriateness and effectiveness of use of the methods. • Alignment with the organisation's needs • Degree to which the approach is repeatable, integrated, and consistently applied • Reliable information and data • Evidence of innovation
Deployment	The strategies, policies and actions should be deployed in relevant areas, in systematic manner	• Deployment addressing the evaluation requirements • Adopted by all appropriate work units.
Assessment and Review	Performance measurement activities should be undertaken, and the outputs should be used to identify, priorities, plan and implement improvement.	• All relevant factors of other three cores (i.e. Results, Approach and Deployment). • Subject to regular measurement

For each sub-section of individual criteria of enablers, measuring items are developed to assess the presence of approaches and the extent of deployment; and for the sub-sections of results orientation, the extent of positive trend in the results is assessed. The structure for developing items in the self-assessment tool is shown in figure 35.

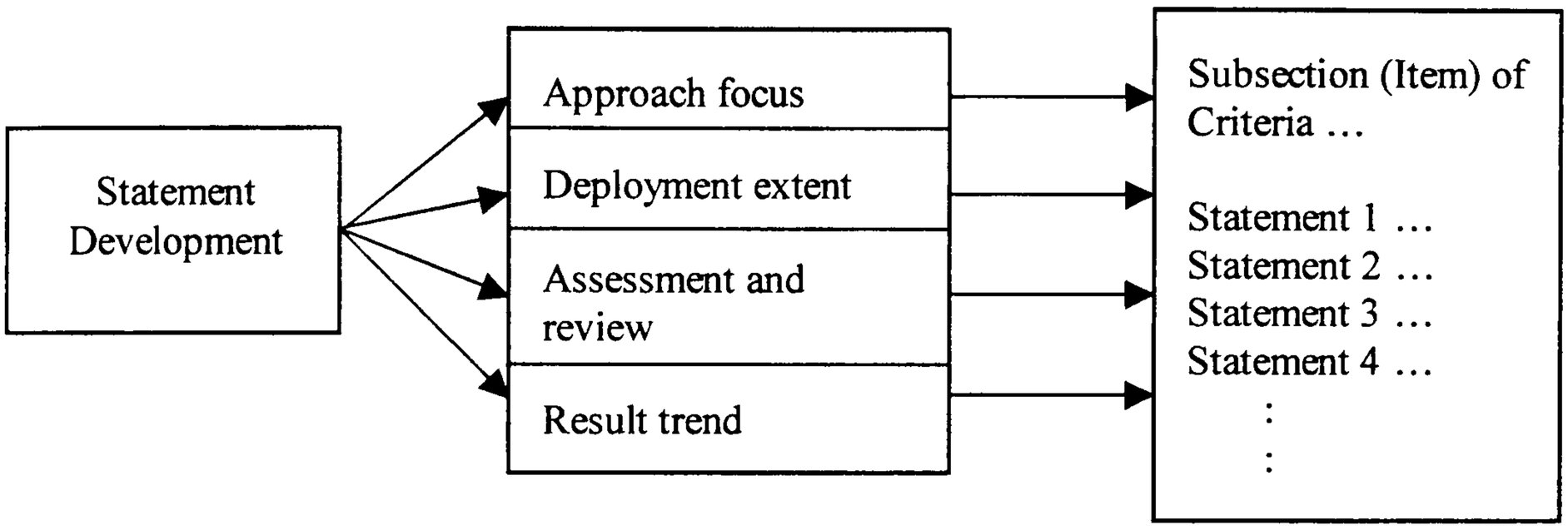

Figure 35. The structure for developing a self-assessment item

Basically, each question addresses a practice that the organisation is expected to have in place. An objective score has to be derived from responses entered in the questionnaire. It should be noted that the self-assessment questionnaire does not query companies about their specific approaches. Instead, companies are asked questions on whether there are approaches in place and they capture data that reflect the performance results of some of the approaches. All measuring items use a 10-point numerical scale format in the questionnaire. The ratings range from 1 (i.e. 'Not at all' and/or 'least significant') to 10 (i.e. 'To a very large extent' and/or 'most significant'). The score is able

to differentiate the overall performance of management practices in an organisation with respect to the requirement of individual model criteria. Management is responsible for the design and revision of the questionnaire, taking into consideration all inputs from representatives of stakeholders (including employees, internal and external customers, and the public).

A sample set of self-assessment questionnaire is given in *Appendix 3*. It is developed mainly for explaining the concepts and focal areas to be addressed in the design and revision of any self-assessment instrument in individual users (rather than a standard questionnaire designed for any organisations). To illustrate how items are developed and included in the questionnaire, examples from category 1 of the SF/PM criteria are shown in figure 36. The particular items refer to the "Corporate Mission, Vision and Values" under the criteria category of *Leadership and Constancy of Purposes*. The self-assessments of these items are based on the approach, deployment cum review and assessment under the enabler dimensions.

User organisations need to design their own questionnaire with respect to their performance objectives, industry sectors and environments within which they operate. A standard self-assessment questionnaire must be used on a regular basis, so that organisations can monitor progress over time and anticipate changes. Nevertheless, if any adjustments need to be made to the standard questionnaire that was designed and currently in use, these adjustments must be kept to a reasonable level. It is because any radical changes may jeopardise the reliability of the model and the chance of getting meaningful and comparable results (Lee and Quazi, 2001).

I. Criteria Requirement:

Areas to Address:
a. Have a mission, a vision, and short and long-term strategy
b. Define clearly the corporate goals
c. Communicate and reinforce the corporate mission, vision and values

II. Questionnaire Version:

1(a) Corporate Mission, Vision and Values	
1) Senior management defines corporate mission, vision and values for the organisation.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
2) The mission is specific to the organisation.	1 2 3 4 5 6 7 8 9 10
3) Senior management define a vision based on customer needs and the capabilities of the organisation.	1 2 3 4 5 6 7 8 9 10

Figure 36. An illustrated example of questionnaire development

8.3.4 Scoring method for self-assessment

The assessors and/or auditors (including management, decision-makers, assigned and/or authorised personnel) can make the scores using their self-assessment questionnaires with respect to the SPI model. Familiarisation session and relevant training on the use of the questionnaire are needed. Since the criteria are designed to be non-prescriptive, the assessors and/or auditors are required to examine whether their organisations have the necessary approaches, and the extent of deployment of their approaches. They assess the ability of the approaches to fulfil requirements and not to judge the approaches against any specific

methods. A scoring method is proposed to allocate a percentage score to each sub-criterion (see figure 37). This is achieved by considering each matrix element for each of the sub-criteria. The scoring guide on Enabler dimensions of criteria is given in figure 38, and on Results dimensions of criteria is figure 39. They are used to facilitate the assessors and/or auditors in making a decision to respond to individual criteria and items. Data collected must be analysed to identify improvement opportunities and control the outcomes and the way they are being perceived. The percentage scores assigned to individual criteria and sub-criteria are then combined to give an overall score.

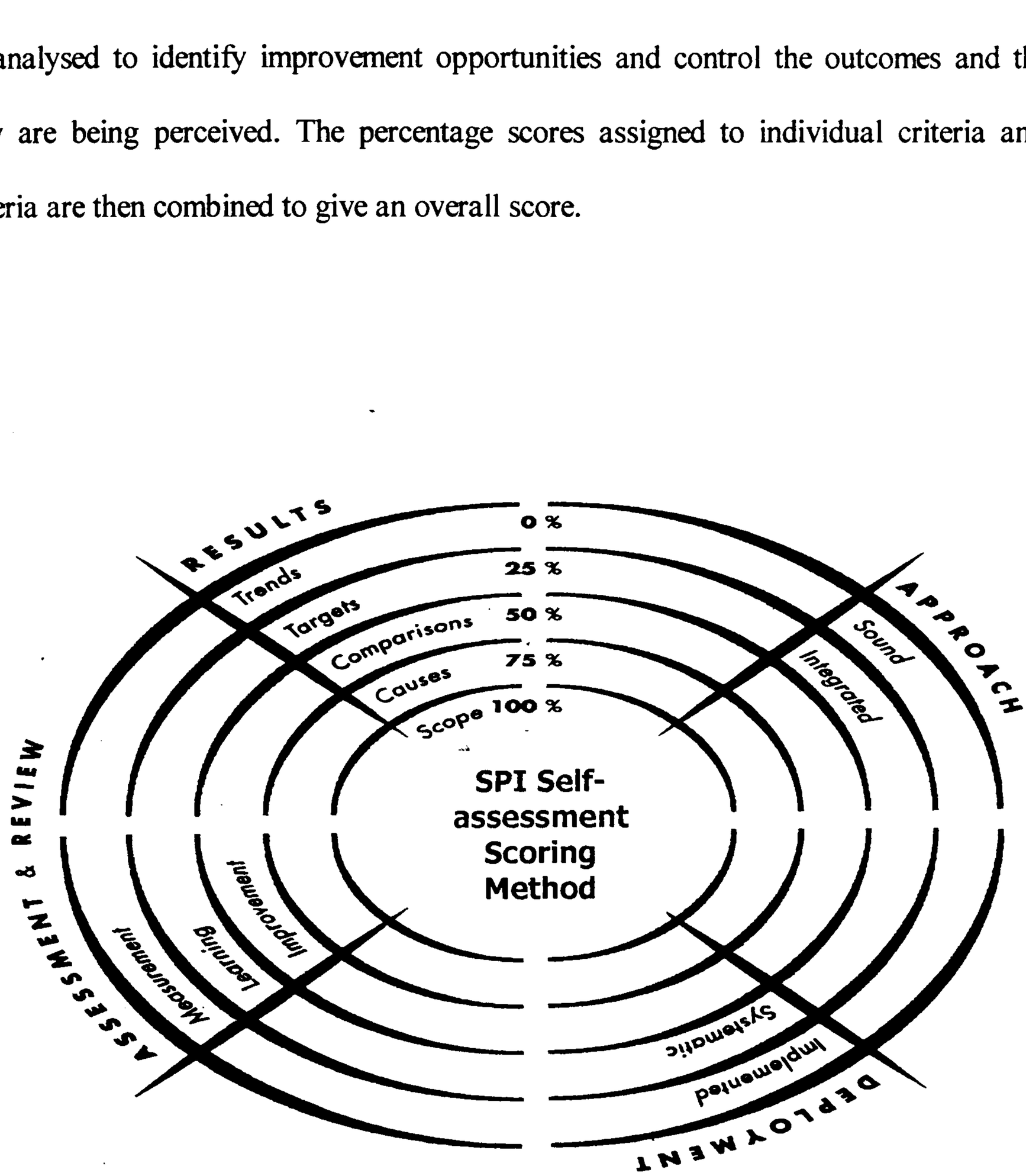

Figure 37. Scoring method of SPI self-assessment
Source: Based on EFQM (2000)

Element	Score Attributes	0%					25%					50%					75%					100%					
Approach	Sound: • Approach has a clear rationale • There are well defined and developed processes • Approach focuses on stakeholder needs	No Evidence or anecdotal					Some evidence					Evidence					Clear evidence					Comprehensive evidence				
	Integrated: • Approach supports policy and strategy • Approach is linked to other approaches as appropriate	No Evidence or anecdotal					Some evidence					Evidence					Clear evidence					Comprehensive evidence				
	Total				5	10	15	20		30	35	40	45		55	60	65	70		80	85	90	95				

Elements	Score	0%					25%					50%					75%					100%					
	Attributes																									
Deployment	Implemented: • Approach is implemented Systematic: • Approach is deployed in a structured way	No Evidence or anecdotal No Evidence or anecdotal					Implemented in about 1/4 of relevant areas Some evidence					Implemented in about 1/2 of relevant areas Evidence					Implemented in about 3/4 of relevant areas Clear evidence					Implemented in all relevant areas Comprehensive evidence				
	Total			0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100			

Element	Score	0%					25%					50%					75%					100%					
	Attributes																									
Assessment & Review	Measurement: • Regular measurement if the effectiveness of the approach and deployment is carried out	No Evidence or anecdotal					Some evidence					Evidence					Clear evidence					Comprehensive evidence				
	Learning: • Learning activities are used to identify and share best practice and improvement opportunities	No Evidence or anecdotal					Some evidence					Evidence					Clear evidence					Comprehensive evidence				
	Improvement: • Output from measurement and learning is analyzed and used to identify, priorities, plan and implement improvement.	No Evidence or anecdotal					Some evidence					Evidence					Clear evidence					Comprehensive evidence				
	Total				5	10	15	20		30	35	40	45		55	60	65	70		80	85	90	95				

Overall					5	10	15	20		30	35	40	45		55	60	65	70		80	85	90	95				

Figure 38. Scoring guide of SPI self-assessment on enabler dimensions of criteria (Approach, Deployment, and Assessment and Review)

Source: Based on EFQM (2000)

Element	Score	0%	25%	50%	75%	100%
	Attributes					
Result	Trends: • Trends are positive and/or there is sustained good performance	No results or anecdotal information	Positive trends and/or satisfactory performance on some results	Positive trends and/or satisfactory performance on many results over at least 3 years	Strongly positive trends and/or sustained excellent performance on most results over at least 3 year.	Strongly positive trends and/or sustained excellent performance in all areas over at least 5 year.
	Targets: • Targets are achieved • Targets are appropriate	No results or anecdotal information	Favorable and appropriate in some areas	Favorable and appropriate in many areas	Favorable and appropriate in most areas	Excellent and appropriate in most areas
	Comparisons: • Comparisons with external organisations takes place and results compare well with industry overage or acknowledged 'best in class'	No results or anecdotal information	Comparisons in some areas	Favorable in some areas	Favorable in many areas	Excellent in most areas and 'Best in Class' in many areas
	Cause: • Results are caused by approach	No results or anecdotal information	Some results	Many results	Most results	All result. Leading position will be maintained.
	Total:	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100

Elements	Score	0%	25%	50%	75%	100%
	Attributes					
	Scope: Results address relevant areas	No results or anecdotal information	Some areas addressed	Many areas addressed	Most areas addressed	All areas addressed
	Total:	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100

Overall	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100

Figure 39. Scoring guide of SPI self-assessment on results dimensions of criteria

Source: Based on EFQM (2000)

Table 59 summarises the conversion factors for individual criteria and sub-criteria that were derived from the AHP analysis of empirical findings (see Sub-sections 7.3.2 and 7.3.4 of *Chapter Seven*). Scores are computed and then recorded in the summary sheet. The maximum score for each criterion ranges from 110-265 points out of a total of 1,000 points. They are added together to calculate the final score points or so-called the overall performance index for the organisation.

Table 59. Conversion factors of SF/PM criteria and sub-criteria

SF/PM Criteria and Sub-criteria	Calculations*	Conversion Factors
1. Leadership and Constancy of Purposes *(Enabler)*	**175/1000 =**	**0.175**
1(a) Corporate Mission, Vision and Values	20/175 =	0.114
1(b) Management Involvement	35/175 =	0.200
1(c) Management Commitment	80/175 =	0.457
1(d) Strategy and Policy Development	40/175 =	0.229
2. Management by Process *(Enabler)*	**110/1000 =**	**0.110**
2(a) Product and Service Processes	20/110 =	0.182
2(b) Sharing of Information	30/110 =	0.273
2(c) Sharing of Knowledge	30/110 =	0.273
2(d) Implementation of Strategy and Policy	30/110 =	0.273
3. People Development *(Enabler)*	**220/1000 =**	**0.220**
3(a) People Education, Training and Development	30/220 =	0.136
3(b) People Well-being and Satisfaction	80/220 =	0.364
3(c) People Involvement	40/220 =	0.182
3(d) People Empowerment	70/220 =	0.318
4. Continuous Improvement *(Enabler)*	**230/1000 =**	**0.230**
4(a) Learning Culture	50/230 =	0.217
4(b) Continuous Innovation	60/230 =	0.261
4(c) Review and Update of Strategy/Policy	50/230 =	0.217
4(d) Balancing and Satisfying Stakeholders' Needs	70/230 =	0.304
5. Results Orientation *(Result)*	**265/1000 =**	**0.265**
5(a) Customer Focus	70/265 =	0.264
5(b) Financial Results	70/265 =	0.264
5(c) Non-financial Results	30/265 =	0.113
5(d) Organisational Effectiveness	50/265 =	0.189
5(e) Social Responsibilities	45/265 =	0.170

Remarks:

* *Point values based the global priority of combined judgements on corresponding sub-criteria from the first series of interview findings (see Tables 48 and 49 of Chapter Seven).*
The values were rounded up according to a scale of 1,000 points.

8.3.5 Conduct of a self-assessment exercise

A self-assessment exercise normally starts with an overview of the business operations with the aid of pathfinder cards that contain questions to be answered quickly in user organisations. The overview addresses what is most important to their business, key influences on how the business operates, and where the business is headed. It includes what is relevant and important to the user organisations and their performance. This serves as a starting point for self-assessment and helps users to focus on key performance requirements and results in business and operations. The assessors and/or auditors of the organisations then assess the current operation and performance status in accordance with the individual items in five categories of SF/PM criteria. Self-assessment also requires some basic skills in collecting and analysing the data. In responding to the requirements of these criteria, the assessors/auditors need to:

1) Understand the aims of each criterion and its sub-items;
2) Examine the approach that meets the aims;
3) Check how the approach is being deployed;
4) Verify what measurements are being taken, and
5) Evaluate the results and performance.

The assessors/auditors measure the performance of self-assessment items, assign a score to each, and then complete a scoring summary sheet. Preferably, all levels of employees in an organisation will participate in the process. Not only the opinions of leaders and senior managers, but also that of middle management and frontline personnel will count. The self-assessment results can provide management with better understanding

of how strategies and practices have been deployed and how their own skills and behaviours are perceived and can be improved. Since it is essential to measure performance externally, customers, suppliers and other stakeholders need to be involved as much as possible in the process. The standard questionnaires can be modified for the purpose of getting feedback from people from within and outside the organisation, who will have a say on how well they think the organisation is doing and on what it intends to improve.

8.3.6 Interpretation of self-assessment scoring results

The SPI model forms a single framework that integrates the performance management system of manufacturing enterprises. The SF/PM criteria are rooted in various strategy determinants and success factors, and ultimately correspond to the quest for performance improvement towards excellence. User organisations can score to the maximum points as assigned in individual criteria. However, this is a holistic model in nature, and therefore it is advisable for users not to reject or neglect any elements from either enablers or results dimensions. The totality of the model has to be applied and the score achieved will reflect the coherent effect of the self-assessment of all criteria.

For the purposes of illustration, assuming that an organisation can achieve 80 percent of scores in all sub-criteria from a self-assessment exercise, the computations of overall performance index are shown in figure 40. Following the scoring guidelines, the score points of individual criteria and items are calculated and then recorded in the scoring summary record sheets.

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	80	x1.14=	91	2(a)	80	x1.82=	145	3(a)	80	x1.36=	109	4(a)	80	x2.17=	174
Sub-criterion	1(b)	80	x2.00=	160	2(b)	80	x2.73=	218	3(b)	80	x3.64=	291	4(b)	80	x2.61=	209
Sub-criterion	1(c)	80	x4.57=	366	2(c)	80	x2.73=	218	3(c)	80	x1.82=	146	4(c)	80	x2.17=	174
Sub-criterion	1(d)	80	x2.29=	183	2(d)	80	x2.73=	218	3(d)	80	x3.18=	255	4(d)	80	x3.04=	243
Scores Obtained:				**800**				**799**				**801**				**800**

Note: 1) Assuming that the organisation can achieve 80 percent of scores in all sub-criteria from the self-assessment exercise

2) The score obtained is the arithmetic average of the % scores for the sub-criteria. If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	80	x2.64=	211
Sub-criterion	5(b)	80	x2.64=	211
Sub-criterion	5(c)	80	x1.13=	90
Sub-criterion	5(d)	80	x1.89=	151
Sub-criterion	5(e)	80	x1.70=	136
Scores Obtained:				**799**

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	**800**	x 0.175	=	140
2. Management by Processes	**799**	x 0.110	=	88
3. People Development	**801**	x 0.220	=	176
4. Continuous Improvement	**800**	x 0.230	=	184
Results Sub-criteria				
5(a) Customer Focus	**211**	x 0.265	=	56
5(b) Financial Results	**211**	x 0.265	=	56
5(c) Non-financial Results	**90**	x 0.265	=	24
5(d) Organisational Effectiveness	**151**	x 0.265	=	40
5(e) Social Responsibilities	**136**	x 0.265	=	36

Total Score Points Obtained: **800**

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.

2) Multiply each score by appropriate conversion factors to give the points obtained.

3) Add points obtained to each criterion to give total score points (i.e. the overall performance index).

Figure 40. An illustrated case for scoring SPI self-assessment

For example, using the Scoring Record Sheet of figure 40, under the Enabler dimensions of criteria, the score of the *Sub-criterion 1(a): Corporate Mission, vision and values* (COM) is determined by the 'Achievement score times Conversion Factor' (i.e. 80% of scores x 1.14[1] = 91 points). Regarding the calculations of total score points, the score the *Enabler Criterion 1: Leadership and Constancy of Purposes* is calculated using the 'Score Obtained times Conversion Factor' (i.e. 800 scores x 0.175 = 140 points). Similarly, the scores for all other criteria and sub-criteria in both enablers and results dimensions can be calculated in such fashion. The results are used to determine the overall performance index for the organisation.

The maximum possible score of the overall performance index is 1000. However, an organisation attaining an overall performance index of 800 scores or above can be considered as an excellent performer, and a score of 600 to 799 as a good performer, respectively. The scoring method stresses the self-assessment of current performance status and improvement potentials. The analysis can help the user utilise its resources and keep up with improvement progress that it may experience. Besides, it can indicate how individual SF/PM criteria are interrelated in responding effectively to the mission, goals and requirements of the organisation.

Using the SPI model for regular self-assessments, user organisations can simulate where they must focus their improvement efforts in a way that maximises their performances and determines their sustained growth. User organisations can determine their

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[1] For the calculations of Conversion Factors, see Table 59

strengths and weakness and identify the constraints that they may have in getting performance improvements above certain levels in particular identified areas.

8.4 Evaluation of the SPI Model and Criteria

8.4.1 Use of self-assessment instruments

All participating organisations in the second series of interviews were invited to examine the sample self-assessment instruments and comment on individual categories of criteria and their recommendations and implications on self-assessment results. Most representatives agree that the model is theoretically sound and the set of sample self-assessment instruments can be useful in their organisations and other manufacturing enterprises. Some indicate their interests in adopting the model and incorporating the self-assessment instruments into their performance measurement exercises.

The two industry experts add that the handful of self-assessment questionnaires offers an aiding means for local manufacturing enterprises in their strategy formulation and performance measures. With respect to individual categories of criteria, implications of self-assessment results on safeguarding company's performance are presented in *Appendix 4*. This provides some insights for manufacturing enterprises to analyse their performance indices and the scores obtained from individual criteria. It also serves as references for assisting them to design self-assessment practices.

8.4.2 Conduct of post-evaluation survey

One of the research objectives is to examine the creditability of using the SF/PM criteria for self-assessment and verify the viable link strategy formulation and performance measures in manufacturing enterprises. It will be more desirable for user organisations to design their own self-assessment questionnaire (as discussed in Sub-section 8.3.3 above) rather than insisting them to use the reference questionnaire. Instead, this research uses a simplified survey questionnaire as attached in *Appendix 5*which was designed for this post-evaluation purpose.

Six out of eight organisations that have participated in the second series of interviews were invited. Two industry experts (i.e. the university and the learned society) were arbitrarily excluded because both were not involved in any parts of actual manufacturing operations. Finally, three organisations joined the post-evaluation survey. Two were manufacturing enterprises, and the third one was a government department that was providing a wide range of support services to the industry. In terms of number of people employed, two of them were large organisations and the other was a SME. A total of 25 responses were made with senior executives and representatives from middle management and front-line personnel in these three organisations.

In order to acquire respondents' views on evaluating the current and expected performance of their organisations, the first part of the questionnaire contains five sets of SF/PM criteria with two scoring columns. All sub-items of criteria use the same 10-point numerical scale format, and the ratings range from 1 (i.e. 'Lowest or worst score') to 10 (i.e.

'Highest or best score') in the survey questionnaire. The respondents were asked to circle the numbers in each column that could represent mostly their views on the performance status of individual criteria sub-items. The following is an example on assessing the performance of *Corporate Mission, Vision and Values*. This indicates that the respondent considers corporate mission, vision and values are in place but not obvious clear in the organisation at the moment (i.e. a score of 5); and expects considerable improvement will happen after a year (i.e. a score of 8).

An illustrated example:

	What do you see today?	***What do you expect a year later?***
1(a) Corporate Mission, Vision and Values	1 2 3 4 (5) 6 7 8 9 10	1 2 3 4 5 6 (7) 8 9 10

8.4.3 Survey results on performance scoring

Twenty completed questionnaires were collected from two large organisations (i.e. A and B) and another five replies from the SME (i.e. Organisation C). Table 60 summarises the scoring records of self-assessments obtained from both senior management groups and representatives groups of three participating organisations in the post-evaluation survey. Some key implications from the scoring records are presented below:

1) Most respondents evaluated the performance status of their organisations consistently with respect to the given list of criteria and items. The self-assessment of current-year performance in Organisation A shown that the mean score of individual items ranged from 4.3 to 7.3 for the senior management group and from 5.1 to 7.0 for the representative group. In Organisation B, the mean scores were

from 4.5 to 8.0 and from 4.1 to 6.6 for these two groups, respectively. The ranges of mean score were smaller as in case of Organisation C where they were from 5.0 to 7.0 and from 5.7 to 7.0 for the senior management group and the representative group, respectively.

Table 60. Scoring records of respondents of a post-evaluation study

	Organisation A				**Organisation B**				**Organisation C**			
SF/PM Criteria and Items for Evaluating Performance Status[a]:	**SM** *N=3*		**Rep.** *N=7*		**SM** *N=2*		**Rep.** *N=8*		**SM** *N=2*		**Rep.** *N=3*	
	Cu	Ne	Cu	Ne	Cu	Ne	Cu	Ne	Cu	Ne	Cu	Ne
1. Leadership and Constancy												
1(a) Corporate Mission	5.0	5.7	5.7	6.3	8.0	8.0	6.6	6.7	6.5	6.5	6.3	7.3
1(b) Management Involvement	4.3	5.0	5.9	6.4	7.5	7.5	5.3	6.1	7.0	7.0	6.7	7.3
1(c) Management Commitment	5.7	6.3	6.4	6.4	7.5	7.5	5.5	6.5	7.0	7.5	5.7	7.3
1(d) Development of Strategy	4.7	6.0	6.0	6.9	7.5	8.5	5.6	6.6	6.5	7.0	6.0	7.7
2. Management by Processes												
2(a) Product/Service Processes	6.0	5.7	6.6	7.1	6.5	6.5	6.1	6.8	6.0	7.0	6.3	7.7
2(b) Sharing of Information	6.7	7.3	5.3	5.7	6.5	7.0	6.0	7.3	6.5	7.0	6.3	8.0
2(c) Sharing of Knowledge	6.7	7.7	5.7	6.0	5.5	6.0	5.5	7.1	6.0	6.5	6.3	8.0
2(d) Implementation of Strategy	6.0	8.0	6.9	7.3	6.0	7.0	5.6	6.8	6.0	6.5	6.0	7.0
3. People Development												
3(a) People Education/Training	6.0	7.3	5.9	6.3	7.5	7.5	4.9	6.3	5.5	7.0	6.0	7.0
3(b) People Well-being	4.7	7.0	5.4	6.1	5.0	4.5	4.1	5.3	6.0	6.0	7.0	7.7
3(c) People Involvement	5.0	7.7	5.1	5.9	5.5	5.0	4.9	5.5	6.5	6.0	6.3	7.3
3(d) People Empowerment	5.7	8.0	5.7	6.4	5.0	6.5	4.9	6.1	6.0	6.5	6.0	7.7
4. Continuous Improvement												
4(a) Learning Culture	6.0	7.7	7.0	7.7	6.5	7.5	5.4	6.6	6.0	7.0	6.0	7.0
4(b) Continuous Innovation	5.3	7.3	6.7	7.6	4.5	5.0	5.1	6.6	5.5	6.5	6.3	7.0
4(c) Review/Update of Strategy	6.7	7.7	6.4	7.4	4.5	5.5	5.4	6.4	5.0	6.5	5.7	6.7
4(d) Balancing Stakeholder Needs	6.3	7.7	5.1	5.6	6.0	5.5	4.9	5.4	5.0	5.0	5.7	6.3
5. Results Orientation												
5(a) Customer Focus	7.0	8.3	6.7	7.4	7.5	8.0	6.5	6.8	6.0	7.0	6.7	7.0
5(b) Financial Results	7.3	8.0	6.7	7.1	6.5	7.5	6.3	7.0	6.5	7.5	6.3	7.0
5(c) Non-financial Results	6.3	9.0	6.7	7.0	6.0	6.0	5.9	6.2	5.5	6.5	6.0	6.0
5(d) Organisational Effectiveness	5.7	8.0	6.3	6.9	5.5	7.0	5.6	6.3	6.0	7.5	6.3	7.0
5(e) Social Responsibilities	6.0	7.3	5.6	5.7	5.5	7.0	5.6	5.8	6.0	6.0	6.3	7.0

Note: [a]Mean scores of individual items based on a 10-point scale (i.e. 1 = Lowest score; 10 = Highest score)
SM – Senior Management (e.g. Senior executives, directors, and senior managers)
Rep – Representatives (e.g. Middle management, engineers, and front-line personnel)
N – Number of respondents
Cu – Weight scores for current-year performance status
Ne – Weight scores for next-year performance status

2) When comparing the mean score on current-year and next-year performance, there were positive changes in most items recorded in the survey. This indicated that most respondents expected improvements of performance status could be achieved in their organisations for the coming year.

3) Meanwhile, there was no evidence that senior management groups gave a higher score on individual items than representative groups did, or *vice versa*. For instance, the representative group of Organisations A and C scored higher on some individual items than the senior management group. The reverse was found in Organisation B.

In order to give a thorough assessment of performance status in these organisations, their mean scores of individual items were examined collectively using the principles, guidelines and pre-determined conversion factors of the SPI model. The mean scores of individual items were processed, and then converted to be 1) the Enablers scores, 2) the Results scores, and 3) the overall performance indices for the organisations. A summary of performance scores and indices of three participating organisations is shown in table 61; and full records of the scoring summary sheets can be found in *Appendix 6*.

Most respondents gave the highest overall mean scores to the Results Orientation criterion, followed by the criteria of Leadership and Constancy, Management by Processes, Continuous Improvement, and then People Development. However, both respondent groups had slightly different views on assessing the performance status of individual criteria, and therefore the scores varied considerably amongst three organisations. For instance, the score differences in current-year performance of the Leadership and Constancy criterion ranged from 80 points (in Organisation C) to 101 points (in Organisation A) and 196 points (in

Organisation B). The differences in criteria scores were carried forward to the calculations of the Enabler scores and the Results scores. As a result, the total score points also varied between two respondent groups in these organisations.

Table 61. Summary of performance scores and indices of participating organisations

	Organisation A				**Organisation B**				**Organisation C**			
SF/PM Criteria for Evaluating Performance Status[Φ]**:**	**SM** *N=3*		**Rep.** *N=7*		**SM** *N=2*		**Rep.** *N=8*		**SM** *N=2*		**Rep.** *N=3*	
	Cu	Ne	Cu	Ne	Cu	Ne	Cu	Ne	Cu	Ne	Cu	Ne
1. Leadership and Constancy	511	590	612	648	756	779	560	646	683	717	603	739
2. Management by Processes	638	730	607	646	608	661	576	701	612	671	620	766
3. People Development	525	748	551	619	543	564	461	573	602	629	643	753
4. Continuous Improvement	605	759	621	696	538	580	516	618	535	615	591	672
5. Results Orientation	659	807	644	688	636	728	606	653	607	700	637	689
Scoring Summary:												
6. Enablers Score (Items 1-4):	414	523	438	480	442	466	380	458	442	478	451	534
7. Results Scores (Item 5):	175	214	171	183	169	193	162	174	161	185	169	183
Total Score Points (i.e. 6+7):	589	737	609	663	611	659	542	632	603	663	620	717

Note: [Φ]Mean scores of individual criteria are presented in a point scale out of 1000
SM – Senior Management (e.g. Senior executives, directors, and senior managers)
Rep – Representatives (e.g. Middle management, engineers, and front-line personnel)
N – Number of respondents
Cu – Weight scores for current-year performance status
Ne – Weight scores for next-year performance status

Source: Abstracted from evaluation records of *Appendix 6*

For the purposes of self-assessment and analysis, a total score of 600 points out of 1000 is an indicator for good performance. Compared with other two, Organisation C (i.e. the SME) was considered as the best performer having the overall performance indices of 603 and 620 points from both respondent groups. On the other hand, one of respondent groups of both Organisations A and B obtained an index of more than 600 points. For instance, the senior management group scored only 589 in Organisation A, whereas the representative group scored 542 in Organisation B. All three organisations expected that the performance status would be improving in different magnitudes in the forthcoming year.

The results affirmed that the scoring method could facilitate organisational learning and help manufacturers to devise their efforts on attaining effective self-assessment and performance improvement.

8.4.4 Relevance of SF/PM practices

The survey further investigated the relevance of the SF/PM criteria to the integration of strategy formulation and performance measurement in participating organisations. In the second part of the questionnaire, respondents were asked to comment on three general statements using the same 10-point numerical scale. Table 62 describes the three statements and shows the results obtained from both respondent groups in three organisations.

The mean scores of the first statement ranged from 7.1 to 8.3, whereas for the second statement was from 6.5 to 7.5 and the third statement was from 6.6 to 8.0. It was found that most respondents had positive views towards the acceptance of three statements. Both respondent groups generally agreed that these criteria could indicate the performance status of their organisations. The design and implementation of performance measures could align with strategy formulation, and these were inseparable in their organisations. Results affirmed that the senior management groups tended to give a higher mean score on these statements than that of the representative group. Two large organisations (i.e. A and B) held stronger overall views than the SME (i.e. Organisation C) considering the relevance of SF/PM criteria to strategy formulation and performance measures. It could be justified by the exploratory nature of the post-evaluation survey that the respondents shared factual

views towards the integration of manufacturing strategy formulation and performance measurement in their organisations.

Table 62. Relevance of SF/PM criteria to strategy formulation and performance measures

	Organisation A		Organisation B		Organisation C	
Relevance of Statements*:	**SM** *N=3*	**Rep.** *N=7*	**SM** *N=2*	**Rep.** *N=8*	**SM** *N=2*	**Rep.** *N=3*
1) The SF/PM criteria and items can indicate the performance status of the organisation.	8.3	7.6	8.0	7.1	8.0	7.5
2) Performance measurement aligns with strategy formulation in the organisation.	7.0	6.7	7.5	6.5	7.0	6.7
3) Strategy formulation and performance measurement are inseparable.	7.3	6.7	8.0	6.6	7.0	7.0

Note: *Mean scores of statements based on a 10-point scale (i.e. 1 = Lowest score; 10 = Highest score)
SM – Senior Management (e.g. Senior executives, directors, and senior managers)
Rep – Representatives (e.g. Middle management, engineers, and front-line personnel)
N – Number of respondents

8.5 A Process Framework for SF/PM Integration

Performance improvements cannot be achieved over night and without thought. Management must understand the questions underpinning the integrated system of strategy formulation and performance measurement on which self-assessment of performance is being made. What has not been implemented cannot be assessed, and zero scoring is self-defeating and de-motivating. The entire organisation or individual functions can be discouraged as a result of low scores, or there can be a tendency to score higher against the SF/PM criteria. Both over-optimistic and under-pessimistic pictures can be created. Recent studies (e.g. Beasley, 1994; Pun *et al.*, 1999) point to the fact that improper self-assessments can cause

organisations to be pushed blind alleys and to take initiative that are not suited to their current state of performance improvement. Many practitioners and researchers have stressed the design, implementation and audits of performance measurement systems (e.g. see Bitichi *et al.*, 2000; Buxton and Ward, 1998; Carpinetti *et al.*, 2000; Kanji and Mours e Sá, 2002; Neely *et al.*, 1995). Some other studies proposed and/or developed different implementation frameworks and guidelines for firms to identify improvement opportunities, formulate strategies and perform performance measures. For instance, Buxton and Ward (1998) suggested a nine-step practice of performance measurement system implementation, whereas Carpinetti *et al.* (2000) proposed a conceptual framework for deployment of strategy-related continuous improvements. Pun *et al.* (2000d) also advocated a 13-step guideline of strategy deployment process using the QFD and *hoshin kanri* approaches to identify performance attributes and deploy processes and strategies with performance measurements.

The empirical study used in this research provides useful data sources and managerial insights in the integration of strategy formulation and performance measurement. An attempt is made, by complementing empirical evidence with the literature base (e.g. Buxton and Ward, 1998; Carpinetti *et al.*, 2000; Pun *et al.*, 2000d), to develop a process framework for implementing the SF/PM initiative in manufacturing enterprises. The framework comprises five stages starting from strategy formulation to implementation and evaluation of an integrated performance measurement system. Figure 41 shows a logical flow of the framework.

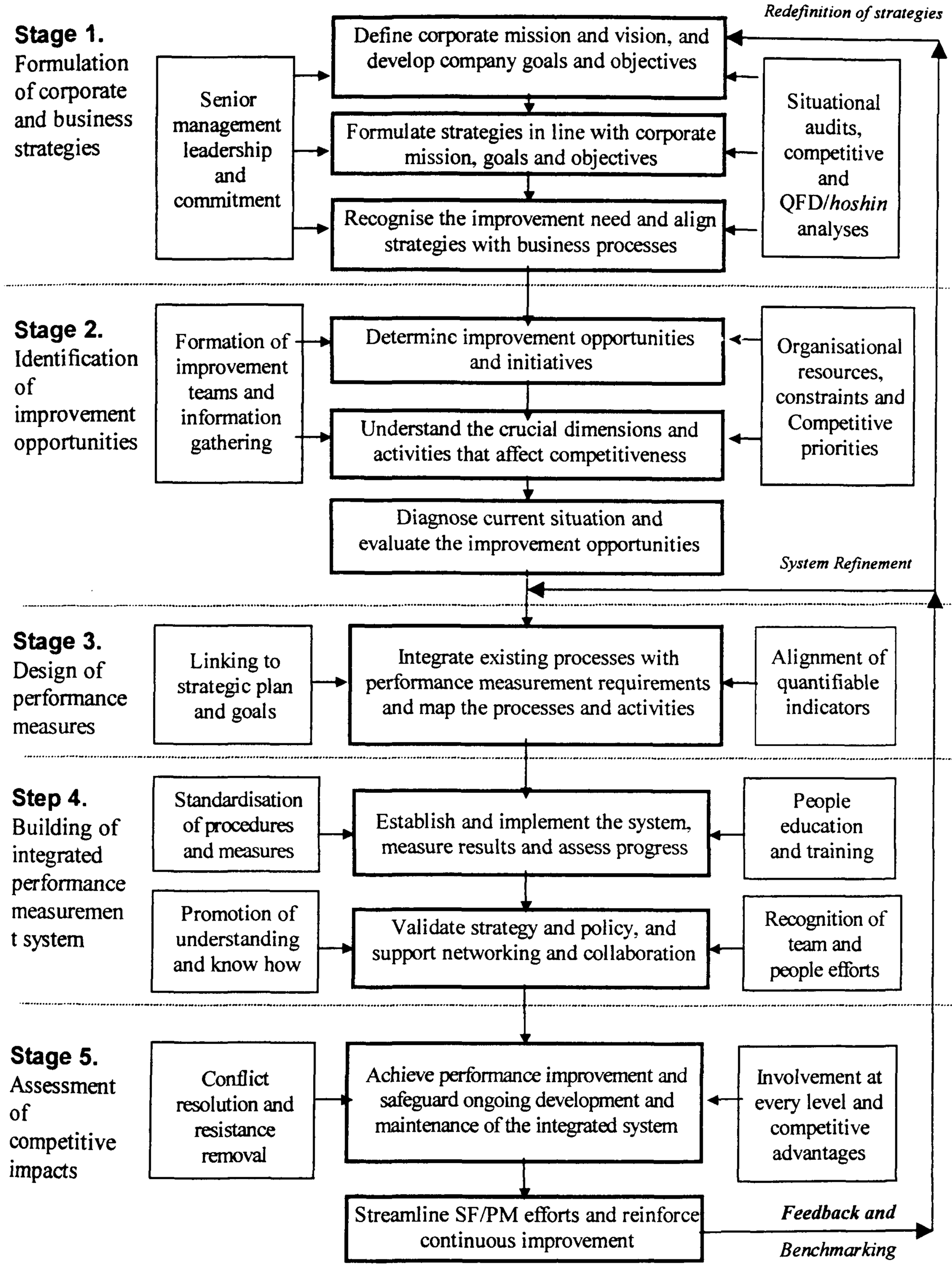

Figure 41. A five-stage process framework for SF/PM integration

The process framework encapsulates the requirements, critical processes and activities of strategy formulation and performance measures into the way they are being managed in organisations. It helps manufacturing enterprises to guide the formulation and deployment of strategies, and create conditions conducive to performance improvement. The five stages are described separately below:

8.5.1 Stage 1: Formulation of corporate and business strategies

During the initial stage of the integration process, senior management are the drivers and facilitators of strategy formulation and performance measures. They need to build the improvement initiative and performance goals and align them with corporate vision, missions and business objectives that drive the organisation towards a preferred strategic direction (e.g. product and service quality improvement, product development and modification, and market development, and strengthening R&D). Senior management leadership and commitment can be demonstrated through, for instance 1) creating an awareness of strategy formulation and performance measurement requirements and its implications for changing the culture, 2) providing training to both management and administrative staff, and 3) ensure that the organisation's managers, at all levels, are held accountable for achieving performance goals (Buxton and Ward, 1998).

Situational audits of the current status (e.g. internal strengths and weaknesses) and competitive analysis of the environments (e.g. external opportunities and threats) help management to determine strategy choices for the organisation. Meanwhile, in recognition the need for improvements, the strategy choices must be integrated with business objectives and

performance goals, and communicated to all employees. The QFD/hoshin analysis facilitates the identification of stakeholders' (including the management, employees, customers, etc) needs, and then translates them into performance attributes (Pun *et al.*, 2000d). These performance attributes can be grouped with respect to their characteristics (e.g. results orientation, leadership and constancy of purposes, people development, and continuous improvement) or various functional areas (e.g. manufacturing, marketing, finance, and R&D). The real challenge lies in moving from the formalities, generalities, and value statements of the strategy document to the reality of implementation at the corporate, plant, and project levels.

8.5.2 Stage 2: Identification of improvement opportunities

In many circumstances, performance improvements are the responses to an internal need (e.g. value-added operations and efficiency improvement), increased competition (e.g. cost leadership, market niche and social accountabilities), and the emergence of statutory requirements (e.g. the government's regulations on environmental protection). Besides, the pressures from consumers and interest groups are the driving forces for continuous improvement and social accountabilities. Steering committees, improvement teams and task or project groups need to be established to 1) acquire strategy-related measures information from internal and external literature sources, documented files and reports; 2) translate stakeholders' needs and voices into performance attributes; and 3) identify potential strategic opportunities and guide the performance improvement process with respect to the organisational structure, resources and constraints (Carpinetti *et al.*, 2000; Pun *et al.*, 2000d).

Various means (e.g. focus group brainstorming exercises, interviews with staff in different functions and hierarchies, analysis of critical incidents, and customers and employee surveys) can be used separately and collectively to evaluate identified opportunities for performance improvement. The process and strategy matrices (i.e. the Houses of Quality (HoQ) in QFD terminology) are to be developed, underlining the identified performance attributes, the requirements of preferred strategies, and organisational functions and activities that can be quantified and controlled for performance improvement (see Section 3.5.2 of *Chapter Three*). These matrices help transform these performance attributes into organisational strategies, and deploy the strategies into various improvement plans in line with corporate goals, business objectives and functional targets (Pun *et al.*, 2000d). Figure 42 shows a simplified version of HoQ matrix which illustrates the interrelationship between company objectives and subsequent actions across an organisation's departments.

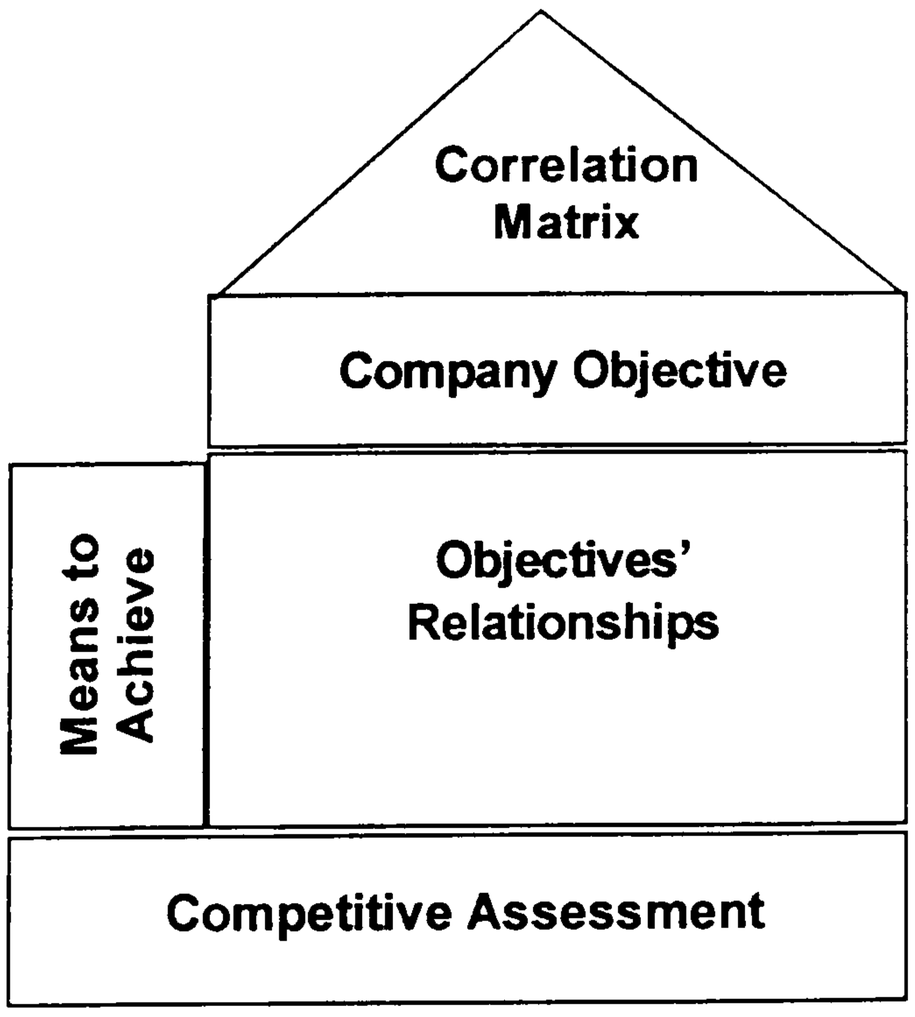

Figure 42. A HoQ matrix for strategy deployment

Challenges may arise from inconsistencies between goals and resources, and across divisions and diverse markets. It is necessary for organisations to:

1) Gather information on product characteristics, target customer and markets, competitive priorities, customer expectations and various areas for performance measures;
2) Identify critical processes and activities that impact performance on prioritised competitive dimensions; and
3) Diagnose current situation and foster the internal growth and external linkages (Carpinetti *et al.* (2000).

In addition to the senior executive leadership and commitment, middle management and front-line personnel must facilitate the improvement efforts (e.g. to encourage employee participation, promote job enrichment, and establish records and documentation in the work place). Through involving individuals in this process and embedding their ideas into the plan, a sense of ownership can be developed to drive strategy deployment and implementation (Sullivan, 1988; Hunt and Xavier, 2003). Key facilitators and barriers of the integration, regarding sharing of information, knowledge training, recognition and rewards must also be identified in this stage.

8.5.3 Stage 3: Design of performance measures

The design stage of performance measures is often running in parallel with Stage 2. This is concerned with the mapping of existing processes and activities to performance

measurement requirements in the value adding chain (Carpinetti *et al.*, 2000). An organisation can start wherever it is by identifying programmes, processes and activities that have existing performance measures, and then link those measures to broader strategic goals (Buxton and Ward, 1998). Key internal and external performance indicators must be identified including both qualitative and quantitative assessments of the critical processes and activities.

The design of measures includes the technical details of the implementation plan(s), for instance, the completion dates, the owners of implementation items, and those actually executing the strategy and plan. The frequency of measurement, responsibilities for data collection, analysis and action must be determined. The self-assessment instruments (e.g. pathfinder cards, and score matrix questionnaires) must be designed with respect to the SF/PM criteria identified for the organisation. These instruments help organisations to design the measures for performance, and devise and guide the implementation of improvement actions (see Sub-section 8.3.3). Various management tools, benchmarking or business processes modeling can be employed, depending on the complexity of the improvement actions. In order to align quantifiable indicators with, and support achievement of, the organisation's mission and goals, focus should be put on capitalising the synergy and improvement of responsiveness to customers and stakeholders (Buxton and Ward, 1998).

8.5.4 Stage 4: Building of an integrated system

The fourth stage is concerned with the establishment and management of the performance measurement system that governs the way in which an organisation operates.

Key system components comprise structured programmes, procedures, specifications, supporting services, and control mechanisms. These must be installed to measure performance, develop process know how and implement improvement actions. Many factors determine the success of strategy deployment and performance measures, including the availability of organisational resources, state of operations, sharing of information and data, and people education and training. The understanding of the system must be promoted by supporting networking and collaboration that ensure cohesion and interconnectivity among important strategic goals and measures. This involves people at every level by determining what information is both relevant and essential to different internal and external users, and includes only the information the users require.

The stage addresses the checking for duplications, inconsistencies, resource shortages and any possible financial constraints of the system. To avoid falling into the trap of developing separate and distinct procedures for each function that has no link to other facets, the building and development of the integrated system needs to be monitored in conjunction with the corporate objectives, changing market demands and emerging new standards and technologies (Bititci *et al.*, 2000; Carpinetti *et al.*, 2000; Kennerley and Neely, 2003). The monitoring secures the proper implementation of the improvement plan(s) and programme(s), and improves the existing measurement system and processes. All positive changes and achievements must be realised, and their procedures and measures must be standardised and documented. It is also critical to communicate the success, and recognise the achievements of individuals and teams in achieving a predetermined target of performance improvements.

8.5.5 Stage 5: Assessment of competitive impacts

Aligning corporate strategies with performance measures can bring along several competitive impacts. First, the organisation can maintain a temporary competitive edge if its competitors cannot react and emulate immediately. Second, this can be a strategic necessity for the organisation if it changes the rules of doing business; and third, the organisation can use a strategic gap to attain a competitive advantage. The gap is the difference in strategic capability between the organisation and its competitors, regarding the company-specific strengths and the ability to create barriers to entry. For instance, a firm can achieve a gap through creating and delivering value to customers in the form of offering differentiated products for which customers are willing to pay a price premium.

This stage regards the evaluation of performance improvements and its relevance to competitive impacts. Top management must set clear directions of what the organisation really needs to accomplish. The assessment would address the existing products/services and operations processes and results, and evaluate the liabilities and opportunities of the corporate value chain. The results of assessment must be compared to previous performance records and extended to benchmark against the performance of competitors and the "best-in-class".

Continual management reviews are essential to maintain and improve the performance. The reviews can be carried out monthly for most levels in the organisation, but possibly as often as weekly for some strategies and tactics. Top management must be prepared to handle the challenges of resources constraints and resolve other potential

problems arisen, such as conflicting goals, insufficient people training, and lack of communications between departments (Pun *et al.*, 2000d). The attainment of competitive impacts lies significantly on people participation and involvement, ongoing maintenance and developments of the system. Feedback and benchmarking results can and should be injected back for refinement of strategy formulation process, redesign of performance measures, and development of the integrated system.

8.6 Adaptation of the SF/PM Integration Model

There is constant pressure on management to improve organisational effectiveness. Different companies may have specific corporate mission, goals and objectives in line with their organisational resources and constraints. However, the process of performance improvement can generally be facilitated with certain characteristics below:

1) Formulation of corporate strategies with supporting performance measurement system that blends with the attributes of the existing corporate structure and culture.
2) Visible leadership and commitment of senior management to corporate strategies, along with active empowerment of improvement and learning initiative that emerge from lower levels of the organisations.
3) Creation of a management structure that encourages integration between strategy formulation, performance measures and business operations.
4) Recognition and adjustment to the needs and abilities of organisational substructures, information and communication.

In many circumstances, the tasks, objectives, direction and involvement, methodological emphasis and administrative context of the SF/PM integration can change with increased organisational maturity. For instance, while support from top management is crucial to success, improvement initiatives often come from middle and lower parts of an organisation. Recognition and encouragement of these initiatives is often key to successful formulation of strategies and policies. Moreover, people training and education is an investment in the corporate commitment to the integration efforts of SF/PM that allows the corporate philosophy to be lived. Manufacturing enterprises need to identify the strengths and shortcomings of current management practice before prescriptions for the future can be made.

The SPI model can provide users with a set of SF/PM criteria and a process framework that guides strategy formulation, manages performance measures and creates conditions conducive to continuous performance improvements. The self-assessment results obtained will constitute a base for comparing performance records, integrating key operations requirements, and stepping towards results-oriented performance improvement. It is anticipated that flexible adaptation of the model with its process framework and scoring method can benefit manufacturing enterprises of different nature and purposes.

8.7 Concluding Remarks

Manufacturing enterprises are increasingly dependent on their capabilities in strategy formulation and performance measures to boost competitive strengths and performance,

irrespective of their sizes and business nature. As greater numbers of firms in virtually every industry sector integrate strategy formulation and performance measurement, this will likely become a strategic necessity. The empirical study used in this research affirms that many strategy determinants and performance criteria (e.g. customer focus, financial results, people empowerment, and balancing and satisfying stakeholders' needs) are facilitating the integration initiative of strategy formulation and performance measurement.

Built upon empirical findings, the proposed SPI model aims to integrate strategy formulation and performance measurement. This holistic model adopts the guiding principles embodied with the Business Excellence Models (e.g. MBNQA and EQA) and stresses the results-oriented assessments on five categories of SF/PM criteria, namely *leadership and constancy of purpose*, *management by process*, *people development*, *continuous improvement*, and *results orientation*. Unlike that of the MBNQA and EQA, the point values for criteria and sub-elements of SPI model were generated collectively from the perspectives of industry practitioners in the manufacturing sectors. These were determined using the normalised weights obtained from the AHP analysis of empirical interview findings. They are taken together to calculate the overall performance index of an organisation.

The SPI model helps manufacturing enterprises to build a self-assessment platform for amalgamating strategies, plans and actions which can enable performance improvement. It can supplement any Business Excellence Models, and serves three important purposes.

1) The model is as a working tool for integrating SF and PM initiative and guiding the implementation of the integrated system in manufacturing enterprises.

2) Using the model can help improve the effectiveness of management practices in relation to performance measures and self-assessment
3) Using the model can facilitate information sharing of best practices within an organisation and benchmark performance against competitors and other organisations.

The findings of a post-evaluation survey verified the potential applicability of the SPI model. Despite the relatively small sample, many respondents agreed that 1) the SF/PM criteria could indicate the performance status of their organisations, 2) the design and implementation of performance measures could align with strategy formulation, and 3) SF and PM were inseparable in their organisations. The results affirm that the SPI model and accompanying self-assessment tools can help organisations to profile their strengths and weaknesses, and identify improvement opportunities with respect to the SF/PM criteria and sub-elements. Internal benchmarking and external comparison of performance are made possible. The five-stage process framework can provide a useful guide for manufacturing enterprises to discern their strategy formulation, identify performance attributes, and align strategy deployment with performance measures. Adapting the model deliberately can help manufacturing enterprises to integrate their strategy formulation and performance measurement for attaining performance improvement goals.

Chapter 9

Conclusions and Recommendations

9.1 Introduction

This research comprehends the concepts of integration of manufacturing strategy formulation and performance measurement. It addresses two problem statements: 1) whether integrating strategy formulation with measurement initiatives can safeguard the performance goals in manufacturing enterprises, and 2) how practitioners can derive an integrated approach for SF and PM system implementation. This chapter summarises the major findings/contributions of this research by underlining the integration efforts for sustaining performance goals in manufacturing enterprises. It is structured according to the conceptual, methodological and modelling issues that are encountered. Possible directions for further study in the research areas are recommended.

9.2 Contributions in This Research Work

This research aims to investigate the attributes of strategy formulation and performance measurement, and proposes an integrated paradigm to attain performance improvement in manufacturing enterprises. Assorted secondary data from literature was collected and analysed. Empirical data and opinions from the personnel responsible for

formulating and implementing strategies and/or measuring performance in their organisations were gathered. A summary of the research works is illustrated in figure 43, and the main tasks are described separately below.

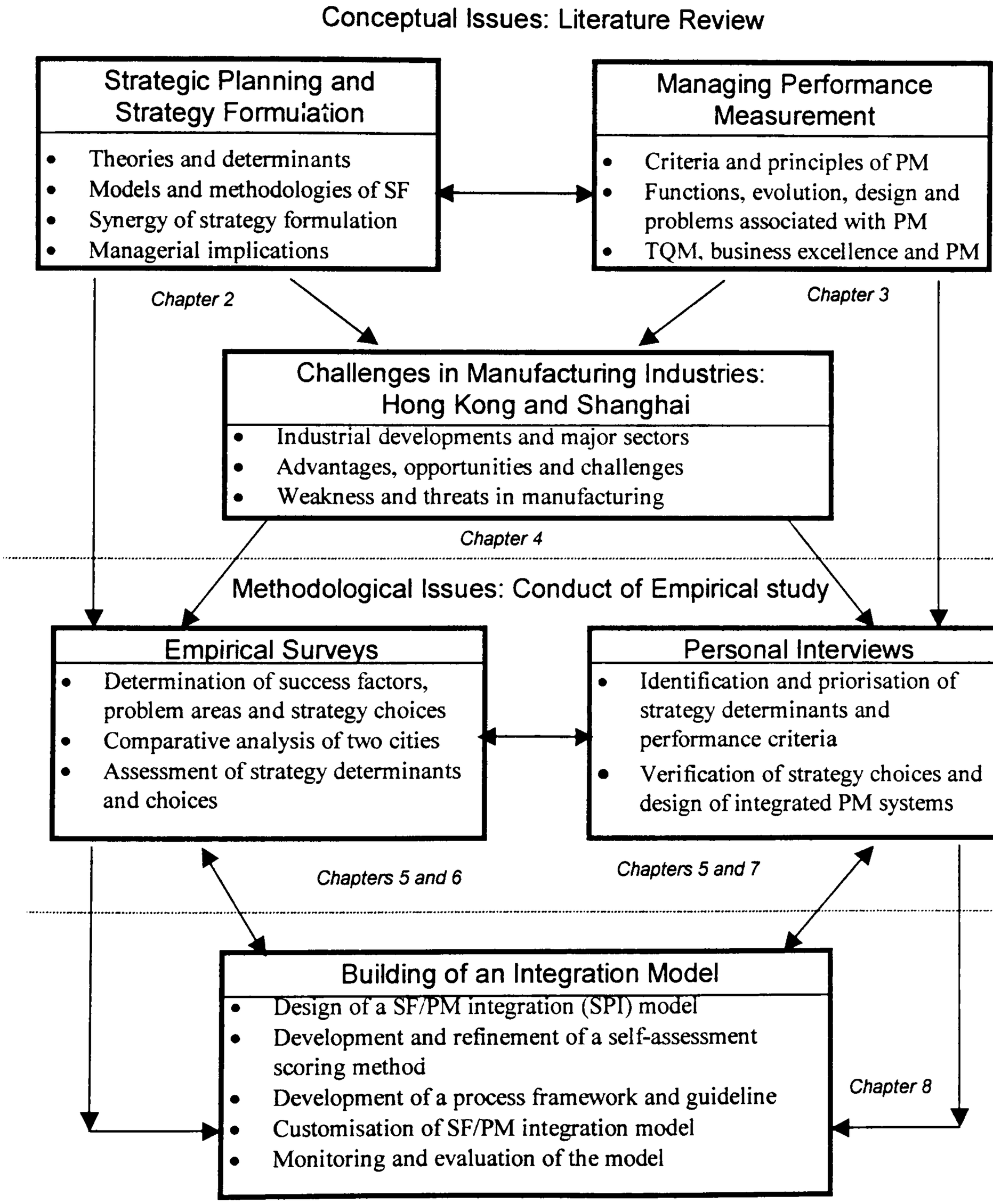

Figure 43. A summary of the research work

9.2.1 Conceptual Issues: Literature Review

The literature review in *Chapter Two* verified that no single strategy process or single planning model can guarantee any organisation to gain sustainable competitive advantage. The characteristics of several planning frameworks and methodologies such as, Porter's (1980) competitive forces model to recent models for example, Mills *et al.*'s (1995) contingency framework of manufacturing strategy process and Pun *et al.*'s (2000a) configuration model for strategy formulation were examined, and a synergy model for manufacturing strategy formulation was derived. This conceptual model encompasses the 'process, content and context' of manufacturing strategy, and stresses the translation of corporate mission and objectives into action plans, the allocation of resources, the assessment and selection among various strategic alternatives, and measures of the results and performance. The review provided a thorough discussion on using the synergy model to examine the competitive priorities and determine the strategic direction for manufacturing enterprises.

The review in *Chapter Three* examined various performance criteria proposed for the design of performance measures, and compares the characteristics of ten selected performance measurement systems (including CBS, CPMP, IPMS, DPMS and IPMF etc). It shows that 1) the majority of these systems and frameworks possess most dimensions of performance, but they still have their own limitations; 2) the PM principles and criteria fit well into quality management philosophy (e.g. TQM, continuous improvement and self-assessment), embracing the principles of business excellence models; and 3) a holistic link exists between PM and strategy development and deployment which can be explored, using the QFD and *hoshin*-based approaches. In *Chapter Four*, the review looked into the

strengths, weaknesses, opportunities and threats of manufacturing enterprises with respect to the industrial developments and challenges in Hong Kong and Shanghai. It provided a portrait of manufacturing environments in both Chinese cities that offer a ground for this research to investigate into the integration of strategy formulation and performance measurements in manufacturing enterprises.

9.2.2 Methodological Issues: Conduct of Empirical Study

A total of 232 Hong Kong firms and 85 Shanghai firms taking part in the study witness the high level of interest that the issues of strategy formulation and performance measurement were causing. The results from empirical surveys (see *Chapter Six*) contributed to the identification of common success factors and problem areas that could help manufacturers to determine their strategy choices in Hong Kong and Shanghai. Correlation coefficient was used to explore potential associations between the pairs of variables (i.e. the size of companies versus success factors, problems and strategy choices). The findings verified that manufacturing firms assess their success factors with similar focus and encounter similar business and operational problems, irrespective of their size in both cities. Besides, a high level of consensus on the preferred strategies choices existed in manufacturing enterprises within and across industry sectors in both cities under investigation. The proposition, on whether manufacturing firms determine strategy choices with respect to their success factors and the problems encountered, was accepted.

Using the Levene's Test for equality of variances, two hypotheses (i.e. H1 and H2) were proven valid, indicating that both corporate strengths and marketing strengths would affect the 'reactive/proactive' strategy choices of manufacturing enterprises in Hong Kong and Shanghai. Another two hypotheses (i.e. H3 and H4) were partly accepted. There was no strong statistical evidence found with $H3_b$ (i.e. technology strengths versus proactive strategies) for Hong Kong group. It could be explained that many Hong Kong organisations are relying on their market niches, and prefer importing and adopting technology to spending more on research and development. The emphasis of technology components might not affect the adoption of proactive strategies in Hong Kong enterprises. Alternatively, many Shanghai organisations stressed the importance of technology components and were attempting to increase their edge by importing technologies and development of their technological capability with the support and encouragement from government.

Both Hong Kong and Shanghai respondents were rather conservative towards the impact of operational strengths on the formulation of proactive strategies, i.e. no strong statistical evidence with $H4_b$ (operational strengths versus proactive strategies). Evidence shows that many Hong Kong companies preferred adopting a lower risk business strategy (e.g. original equipment manufacturing contracts) without taking into account of their operational strengths. On the other hand, many Shanghai organisations, particularly those state-owned enterprises and independent organisations have not taken well to seeking their operational strengths and negotiating for their own inputs. The findings provided references for manufacturers in two cities to determine the relationship amongst the SF/PM criteria, their preferred strategies and enterprise performance.

The subsequent interviews in Hong Kong complemented the survey findings. The first interview series acquired industry practitioners' views on the strategy determinants and performance criteria. An analytical framework using AHP methodology was developed to administer the data acquisition and analysis process. The AHP analysis helped accommodate both objective and subjective judgements of practitioners from 26 participating organisations, in order to make trade-offs and to determine priorities among the criteria, sub-criteria and anticipated benefits. The consistency test employed validated the utility of data by means of matrix computation (see Section 7.3, *Chapter Seven*). It was found that the practitioners shared the similar focuses of manufacturing strategy formulation and performance measurement on attaining performance goals. The normalised weights of their judgements provided an empirical base that helped devise a self-assessment scoring mechanism for the criteria and sub-elements. The analytical framework also demonstrated a priority-setting approach that could be modified for conducting similar studies in industry with different business needs and constraints.

The second series of interviews examined the management issues in integrating manufacturing strategy formulation and performance measures, with regards to the complexity of the product/process, technological, organisational and managerial choices, and performance levels reached in manufacturing enterprises (see Section 7.4, *Chapter Seven*). Senior executives from four holders of the Hong Kong Award for Industry, and four industry experts and representatives from government departments, were interviewed. The results 1) substantiated the complementary nature of strategy formulation and performance measures, 2) validated the importance of strategy determinants and performance criteria, and 3) verified the strategy choices, industry and strategy trends, and

performance measurement system design in manufacturing enterprises. Despite devising in the Hong Kong's industry and business environment, the interview findings could have wider implications in generality, and affirmed the synergy prospect in the areas of manufacturing strategy formulation and performance measurement.

9.2.3 Modelling issues: Development of SPI Model

Built upon the guiding principles embodied with the business excellence models (including MBNQA and EQA), the research fits the findings from both stages of empirical study into a SF/PM Integration (SPI) model. The proposed model comprises five categories of SF/PM criteria, a results-oriented scoring mechanism, and a five-stage process framework (see *Chapter Eight*). The scoring point values were determined using the AHP analysis of empirical interview findings. The process framework encapsulates the requirements and critical processes of strategy formulation and performance measures in organisations. It can provide guide for manufacturing enterprises to discern their strategy formulation, identify performance attributes, and align strategy deployment with performance measures.

The results obtained from a post-evaluation survey verified the potential applicability of the model. Most respondents agreed that 1) the SF/PM criteria could indicate the performance status of their organisations, 2) the design and implementation of performance measures could align with manufacturing strategy formulation, and 3) the SF and PM initiatives would be inseparable in their organisations. The findings affirmed that

the SPI model and the scoring method could help manufacturing enterprises profile their strengths and weaknesses, and identify improvement opportunities with respect to the set of SF/PM criteria and sub-elements.

9.3 Discussions and Conclusions

In contrast to existing strategy and performance literature, this research provides an empirical profile of strategy formulation and performance measurement in manufacturing enterprises operating to the business and industry environment in Hong Kong and Shanghai. The empirical part identifies the key strategy determinants and performance criteria, and shows the impacts of SF/PM integration on safeguarding performance goals in manufacturing enterprises. The results add depths and new dimensions to the interpretation of empirical research on the areas of manufacturing strategy formulation and performance measurement.

The emphasis of this research is on the establishment of the SPI model, addressing how the SF/PM criteria are derived, what appropriate scoring method is used, and how the instruments are validated. The model is unique in terms of its synergy and compatibility with manufacturing strategy formulation and performance measurement. This holistic model constitutes five *enablers* and *results* categories of criteria, comprising the Leadership and Constancy of Purpose, Continuous Improvement, Management by Process, People Development, and Results Orientation. The SPI model uses 1,000 points for self-assessment which is comparable with other business excellence awards (e.g. MBQNA,

EQA). Using the AHP analysis of empirical interview findings to determine the score values of SF/PM criteria and sub-elements has its unique feature. Accompanying the five-stage process framework, the model can assist manufacturing enterprises to:

1) Align the integration processes with corporate missions and objectives;
2) Establish a platform for amalgamating organisational strategies, plans and actions;
3) Measure performance with respect to the strategy determinants and performance criteria identified;
4) Improve and streamline the performance management practices;
5) Control and monitor the processes of performance improvement; and
6) Safeguard performance goals and foster continuous improvement.

Many companies start their self-assessment exercises because they are finding opportunities for improvement, directing improvement processes, linking performance with strategic planning, providing new motivation for improvement, and stimulating internal competition, as well as going for quality or business excellence awards. The SPI model serves as a working tool for integrating both SF and PM initiatives and guiding the implementation of performance measurement system in organisations. Using the model can help manufacturing enterprises to consistently and adequately measure (and manage) their performance with respect to the SF/PM criteria from both internal and external perspectives. It promotes internal and external communications, and foster customer-focused measurements in manufacturing enterprises. The model also allows benchmarking to be made within an organisation, among different organisations and across different industries and sectors.

9.4 Recommendations for Future Work

This research achieves its objectives by identifying key attributes of strategy formulation and performance measurement, and proposing an integrated paradigm that help manufacturing enterprises to attain performance goals. With respect to this, the possibility of enriching the theories and extending the knowledge and applications of strategy formulation and performance measurement need to be explored. For instance, is there a "best set" of manufacturing strategy formulation and performance measures appropriate for a particularly improvement initiative? These are but three venues raised by this study which warrant future research, and described separately as follows.

9.3.1 Extended scope of empirical studies

Future research can validate the key strategy determinants and performance criteria identified for large manufacturing enterprises and SMEs of different operations nature, separately and collectively. In order to reveal sector-specific characteristics, comparative evaluations of strategy formulation and implementation should be conducted across various manufacturing sectors and other non-manufacturing sectors. Case studies are suggested to investigate the detailed strategy formulation processes and their determinants in manufacturing enterprises across different sectors not only in Hong Kong and Shanghai, but in the wider regional and global contexts. The comparison of findings can help determine whether the results are significantly different. It is useful to investigate the extent to which the employment of the SPI model contributes towards achieving sustainable

competitive advantage in various manufacturing enterprises. The applicability of the SPI model can be extended to different industry sectors and disciplines whereby new attributes and elements can be included. Moreover, the future research findings can be enhanced through improvements in the acquisition of timely and properly processes data, the methodologies and techniques used to elicit empirical information and subjective judgements, and a sharper focus on the pertinent parts of the evaluation.

9.3.2 Culture values and influences

Cultural value, measured from the Western and Eastern perspectives, is a dominant factor in economic performance (Franke *et al.*, 1991). Of particular interest to academics and practitioners has been related to how corporate culture is created, transferred and sustained. Effective integration of SF/PM relies significantly on the appropriateness of corporate culture and management practice in organisations. The managerial philosophies and practices of Chinese enterprises differ substantially from the Western counterparts. A universal approach to organisational performance improvement will simply not be present particularly one that may be applied in different cultural settings.

Although the culture issue has been included as the 'learning culture' sub-criteria of the SPI model, the significance of its impact on SF/PM puts the culture factors to be an important agenda for future studies. Some specific research issues are spelt out:

1) A comparative analysis of the differences between Anglo-American and Chinese cultures and their influences on manufacturing strategy formulation and performance measurement;
2) Impact of tacit knowledge base existing within manufacturing enterprises on strategy formulation and performance measurement; and
3) The cultural changes in manufacturing enterprises and the links of cultural values to SF/PM integration.

9.3.3 IT applications of SPI self-assessment

As far as the concern on the IT applications in manufacturing strategy formulation and performance measurement, this provides a feasible ground to computerise the SPI model as self-assessment software, a training tool, and a web-enabled system. The idea of self-assessment software means that there is a ready-made methodology for applying the model to a business. Questionnaire-type approaches offer an easy introduction to the concept of self-assessment. Tools such as those aid self-assessment and make it attractive to the wider business community, especially those that are designed in computer-based, or completing a questionnaire which will generate a score based on the user inputs (Bititci *et al.*, 2002).

The design of self-assessment instruments (e.g. the pathfinder cards, score matrix questionnaire or checklist) and the way of determining the conversion factors for individual SF/PM criteria and sub-elements are of methodological focus. These can be readily codified and processed using computing languages and Internet technologies (e.g. Active Server Pages

(ASP) and Common Gateway Interface (CGI)). Therefore, future work based on the SPI model can be on the development of a computer-based or web-enabled performance measurement system with emphasis on user interface design, intelligent tutoring facilities and organisational learning capabilities. Besides, more research is required to address the impact of different business environments on the performance of the new system.

9.4 Epilogue

The ultimate objective of integrating strategy formulation and performance measurement is to assist manufacturing enterprises in their quest for better performance and business excellence. The SF/PM integration brings changes by aligning corporate missions and strategies with operational goals, management systems, daily practices and behaviour in manufacturing enterprises. These changes are concerned about culture, value, management, people and communication.

As business and operational situations vary in manufacturing enterprises, managing the SF/PM integration will only succeed if they are implemented as a long-term organisational paradigm shift, but not a quick fix. The novelty of this research is to 1) identify the key SF/PM attributes and convert them into a list of SF/PM criteria, 2) determine the scoring method for self-assessment and benchmark performance achievements, and 3) develop the SPI model with a process framework that provides a useful guide for manufacturing enterprises to integrate their SF/PM initiative for achieving performance goals.

Coupled with empirical findings, this research concludes that performance improvement based on the SF/PM integration is a never-ending process; and manufacturing enterprises must evolve a holistic performance measurement system matching their corporate mission, objectives and strategies. Customer focus, financial results, management commitment, people empowerment, and balancing and satisfying stakeholders' needs are key driver of continuous performance improvement in manufacturing enterprises. Using the proposed SPI model provides a feasible means which can help manufacturing enterprises to devise their efforts on attaining effective self-assessment, organisational learning, and more importantly, strategy-driven performance goals.

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List of Appendices

Appendix 1:

Research Instruments of a Two-stage Empirical Study

List of Annexes:

A1.1 A Sample Survey Questionnaire

Survey on Management Issues in Strategy Formulation

The purpose of this survey *is to acquire the management perceptions on success factors, problematic areas, and strategy options that may affect strategy formulation in manufacturing enterprises. Your responses will be kept confidential, and all findings will be used for this study only. If you have any queries, please call* K.F. Pun *at* 27888306 *and/or fax to* 27888423.

Please tick " √ " the appropriate answer(s) in the boxes [ ] provided.

****

A. COMPANY INFORMATION

Q.1 How long has your company been established in Hong Kong?

1.	Less than one year	[ ]
2.	1-5 years	[ ]
3.	6-10 years	[ ]
4.	Over 10 years	[ ]

Q.2 How many full-time employees are currently serving your company?

		In Hong Kong	Outside Hong Kong
1.	0	[ ]	[ ]
2.	1 - 20	[ ]	[ ]
3.	21 - 50	[ ]	[ ]
4.	51 - 100	[ ]	[ ]
5.	101 - 200	[ ]	[ ]
6.	201 and more	[ ]	[ ]

Q.3 What is (are) the principle product(s) of your company?

(You can tick more than one choice if applicable)

1.	Electronics (includes parts and components, etc)	[ ]
2.	Clothing (includes wearing apparels)	[ ]
3.	Textiles (includes materials and fabrics, etc)	[ ]
4.	Plastic Products	[ ]
5.	Electrical Appliances	[ ]
6.	Others, please specify: _____	[ ]

Q.4 What is (are) the major market(s) of your company's products?

(You can tick more than one choice if applicable)

1.	Hong Kong (local market)	[ ]
2.	Asia Pacific (excluding Hong Kong and Mainland)	[ ]
3.	Mainland China (the People's Republic of China)	[ ]
4.	Americas (north and south)	[ ]
5.	Europe (exclude Russia)	[ ]
6.	Others, please specify: _____	[ ]

Q.5 Which of the followings best describe the ownership of your company?

1.	Local ownership (Hong Kong capital)	[ ]
2.	Local and China joint ownership	[ ]
3.	Local and overseas joint ownership	[ ]
4.	Others, please specify: _____	[ ]

B. YOUR VIEWS ON BUSINESS OBSTACLES & SUCCESS

Q.6 To what extent do you think the following factors have been contributing to the business success of your company? *(Please tick one box for each factor using the five-point scale below)*

		Strongly Disagree 1	2	3	4	Strongly Agree 5
1.	Accessibility to markets	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Availability of funds and capitals	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Availability of workforce	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Company's location	[ ]	[ ]	[ ]	[ ]	[ ]
5.	Company's mission	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Company's policies	[ ]	[ ]	[ ]	[ ]	[ ]
7.	Company's reputation	[ ]	[ ]	[ ]	[ ]	[ ]
8.	Company's strategies	[ ]	[ ]	[ ]	[ ]	[ ]
9.	Costs of production and operation	[ ]	[ ]	[ ]	[ ]	[ ]
10.	Customer services	[ ]	[ ]	[ ]	[ ]	[ ]
11.	Employee involvement	[ ]	[ ]	[ ]	[ ]	[ ]
12.	Information technology and systems	[ ]	[ ]	[ ]	[ ]	[ ]
13.	Management commitment	[ ]	[ ]	[ ]	[ ]	[ ]
14.	Market share	[ ]	[ ]	[ ]	[ ]	[ ]
15.	Market positioning	[ ]	[ ]	[ ]	[ ]	[ ]
16.	Materials supply	[ ]	[ ]	[ ]	[ ]	[ ]
17.	Product mix and range	[ ]	[ ]	[ ]	[ ]	[ ]
18.	Product and service quality	[ ]	[ ]	[ ]	[ ]	[ ]
19.	R&D and Innovation capabilities	[ ]	[ ]	[ ]	[ ]	[ ]
20.	Workforce skills and abilities	[ ]	[ ]	[ ]	[ ]	[ ]
21.	Others, please specify: _____	[ ]	[ ]	[ ]	[ ]	[ ]

Q.7 Comment on the significance of the impact of the following problematic areas in your company. *(Please tick one box for each item using the five-point scale below)*

		Very Insignificant 1	2	3	4	Very Significant 5
1.	Cash flow problems	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Effects of protectionism	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Few current and/or potential markets	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Few suppliers and/or vendors	[ ]	[ ]	[ ]	[ ]	[ ]
5.	High employee turnover	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Increasing production costs	[ ]	[ ]	[ ]	[ ]	[ ]
7.	Insufficient research and development	[ ]	[ ]	[ ]	[ ]	[ ]
8.	Keen local competition.	[ ]	[ ]	[ ]	[ ]	[ ]
9.	Lack of government support	[ ]	[ ]	[ ]	[ ]	[ ]
10.	Low productivity	[ ]	[ ]	[ ]	[ ]	[ ]
11.	Political influence	[ ]	[ ]	[ ]	[ ]	[ ]
12.	Strong overseas competitors	[ ]	[ ]	[ ]	[ ]	[ ]
13.	Others, please specify: _____	[ ]	[ ]	[ ]	[ ]	[ ]

C. *YOUR VIEWS ON STRATEGY CHOICES*

Q.8 To what extent do you agree with the following strategy options that suit your company's needs and requirements? *(*Strategy options are described in the glossary for your reference. Please tick one box for each option using the five-point scale below.)*

		Strongly Disagree 1	2	3	4	Strongly Agree 5
1.	Business withdrawal or divestment	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Importing technologies	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Importing workforce	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Joint ventures	[ ]	[ ]	[ ]	[ ]	[ ]
5.	Product line extension	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Product modification	[ ]	[ ]	[ ]	[ ]	[ ]
7.	Product and service quality improvement	[ ]	[ ]	[ ]	[ ]	[ ]
8.	Related business development	[ ]	[ ]	[ ]	[ ]	[ ]
9.	Selective investments	[ ]	[ ]	[ ]	[ ]	[ ]
10.	Sub-contracting	[ ]	[ ]	[ ]	[ ]	[ ]
11.	Horizontal integration	[ ]	[ ]	[ ]	[ ]	[ ]
12.	Market development	[ ]	[ ]	[ ]	[ ]	[ ]
13.	Market diversification	[ ]	[ ]	[ ]	[ ]	[ ]
14.	New business development	[ ]	[ ]	[ ]	[ ]	[ ]
15.	New product development	[ ]	[ ]	[ ]	[ ]	[ ]
16.	Product diversification	[ ]	[ ]	[ ]	[ ]	[ ]
17.	Production automation	[ ]	[ ]	[ ]	[ ]	[ ]
18.	Staff education and training	[ ]	[ ]	[ ]	[ ]	[ ]
19.	Strengthening research and development	[ ]	[ ]	[ ]	[ ]	[ ]
20.	Vertical integration	[ ]	[ ]	[ ]	[ ]	[ ]
21.	Others, please specify: _____	[ ]	[ ]	[ ]	[ ]	[ ]

Q.9 To what extent do you think the following strategy determinants that affect your Company's decisions on strategy options? *(Please tick one box for each factor using the five-point scale below)*

		Least Important 1	2	3	4	Most Important 5
1.	Corporate Strengths	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Marketing Strengths	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Technology Strengths	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Operational Strengths	[ ]	[ ]	[ ]	[ ]	[ ]

Q.10 Under each strategy determinant, please evaluate the importance of its components that facilitate the determination of strategy options in your company? *(Please tick one box for each component using the five-point scale below)*

	Least Important 1	2	3	4	Most Important 5
a. Corporate Strengths:					
1. Availability of funds and capitals	[ ]	[ ]	[ ]	[ ]	[ ]
2. Company's mission	[ ]	[ ]	[ ]	[ ]	[ ]
3. Management commitment	[ ]	[ ]	[ ]	[ ]	[ ]
b. Marketing Strengths:					
4. Accessibility to markets	[ ]	[ ]	[ ]	[ ]	[ ]
5. Company's reputation	[ ]	[ ]	[ ]	[ ]	[ ]
6. Market positioning	[ ]	[ ]	[ ]	[ ]	[ ]
7. Product and service quality	[ ]	[ ]	[ ]	[ ]	[ ]
c. Technology Strengths:					
8. Information technology and systems	[ ]	[ ]	[ ]	[ ]	[ ]
9. R&D and innovation capabilities	[ ]	[ ]	[ ]	[ ]	[ ]
d. Operational Strengths:					
10. Company's location	[ ]	[ ]	[ ]	[ ]	[ ]
11. Costs of production and operations	[ ]	[ ]	[ ]	[ ]	[ ]
12. Workforce skills and abilities	[ ]	[ ]	[ ]	[ ]	[ ]

Q.11 If you have further comments on business obstacles, success, and other considerations, please write below:

_____

_____

_____

_____

Q.12 What is your current position or job title in the company?_____

If you want to have a copy of the summary of survey findings, please attach a business card and tick the box. [ ]

****

Thank for your help and participation in the survey

Please return the questionnaire to:

Department of Manufacturing Engineering and Engineering Management
City University of Hong Kong, Tat Chee Avenue, Kowloon, HONG KONG
(Fax: 2788 8423)

Glossary of Strategy Options: *(For Reference Only)*

- **Business withdrawal or divestment** - A strategy, which a part of a business is sold off, is motivated by a firm's decisions to focus on certain aspects of its operation that no longer fit, and/or reduce costs and improve profitability by selling unprofitable parts.
- **Importing technologies** - A strategy uses money or other rewards to access and acquire new and adaptable technologies in products, tools and machinery of technological advancement that a country lacks.
- **Importing workforce** - A strategy that uses money or other rewards to attract and employ people from other countries/regions to work as part of the work force of a country.
- **Joint ventures** - This regards a commercial undertaking entered into by two or more parties, mostly in short term, to share costs, exploit new technologies and gain access to new markets.
- **Horizontal integration** - Horizontal integration is also known as lateral integration. It is concerned with a combination of two or more companies under same control for their mutual benefit by reducing competition and saving costs. These companies carry out the same stage in the production process or produce similar products/services.
- **Market development** - This is a strategy by which an organisation tries to sell its existing products to new customers in new geographical areas.
- **Market diversification** - This is a strategy of selling existing products to new markets.
- **New business development** - This is to develop a new business/trade because of an existing business's expansion. For example, the popularity of computer hardware leads to the development of software computer businesses.
- **New product development** - This is a strategy that offers modified/new products to the market segments currently being served.
- **Product diversification** - This is a strategy of marketing new products to new markets or set of customers.
- **Product line extension** - This is a strategy that regards a new item/new line of items added to an existing product line. A product line consists of a group of products that are closely related because they function in a similar manner, sold to the same customer groups and marketed through the same types of outlets or fall within particular price ranges.
- **Product modification** - This strategy aims to modify the existing products/markets to customers. Modifications can be made on various aspects on the product, depending on its usage and market.
- **Product or service quality improvement** - This strategy regards the advancement in the quality of products/services a firm offers. Quality is the totality of the features and characteristics of a product/service that has the ability to satisfy stated or implied needs.
- **Production automation** - This regards the use of computers, adding of machinery or other forms of automation to the process of production.
- **Related business development** - The strategy aims to development of new services, products or businesses that is derived from or relevant to its principle business. For example, the development of the business of pens leads to the development of the business of ink.
- **Staff education and training** - This is to introduce, improve and strengthen the job-related skills and learnt techniques of staff to the needs and requirements of a company.
- **Selective investments** - This is an organised investment provided by individuals or companies and shareholders on specific markets or line of businesses that may yield optimum results.
- **Strengthening research and development** - This is an embellishment of the scientific and marketing evolution of a new product or service in a company. It can be obtained during the process of production and/or right after the product has been introduced into the market.
- **Sub-contracting** - This is a strategy of outsourcing and employing outside contractors and/or companies to do work as part of a larger project for a company.
- **Vertical integration** - This is to obtain control of two or more suppliers (i.e. backward integration) or buy their products/services (i.e. forward integration) in order to reduce competitions and save cost.

A1.2 A Sample Questionnaire of First Interviews

Decision Attributes of Strategy Formulation and Performance Measures in Manufacturing Enterprises

The purpose of this questionnaire *is to acquire your views on the decision attributes (including criteria, sub-criteria and benefits) that may affect strategy formulation and its alignment with performance measures in your organisation. Your response will be kept confidential, and all findings will be used for this study only.*

Section A: General information

Name of Organisation: _____

Name of Participant: _____

Position and/or Job Title: _____

Years of Service in Position: _____

Industry Type and/or Sector: _____

Number of employees: _____

Business Nature and Ownership: _____

Section B: Pairwise Comparison

B.1: Comparison amongst Criteria

Q.2 What is the relative importance amongst the given criteria that affect both strategy formulation and performance measures in your organisation?

Make a pairwise comparison of criteria and circle one answer using the scale below:
1 = Equal; 3 = Moderate; 5 = Strong; 7 = Very Strong; 9 = Extreme

a) ***Leadership & Constancy*** versus *other criteria*

	Increasing Importance ←									→ *Increasing Importance*								
Leadership & Constancy (LC)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Results Orientation (RO)
Leadership & Constancy (LC)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Management By Process (MP)
Leadership & Constancy (LC)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	People Development & Involvement (PD)
Leadership & Constancy (LC)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Continuous Improvement (CI)

b) ***Results Orientation*** versus *other criteria*

	Increasing Importance ←									→ *Increasing Importance*								
Results Orientation (RO)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Management By Process (MP)
Results Orientation (RO)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	People Development & Involvement (PD)
Results Orientation (RO)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Continuous Improvement (CI)

c) ***Management by Process*** versus *other criteria*

	Increasing Importance ←									→ *Increasing Importance*								
Management By Process (MP)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	People Development & Involvement (PD)
Management By Process (MP)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Continuous Improvement (CI)

d) ***People Development & Involvement*** versus ***Continuous Improvement***

	Increasing Importance ←									→ *Increasing Importance*								
People Development & Involvement (PD)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Continuous Improvement (CI)

B.2: Comparison amongst Decision Sub-criteria

Q.3 What is the relative importance amongst the listed sub-criteria within the ***Leadership & Constancy*** criterion that facilitates strategy formulation and performance measures in your organisation?

Make a pairwise comparison of sub-factors and circle one answer using the scale below:
1 = Equal; 3 = Moderate; 5 = Strong; 7 = Very Strong; 9 = Extreme

a) ***Corporate Mission, Vision & Values*** versus *other sub-criteria*

Increasing Importance ← → *Increasing Importance*

Corporate Mission (COM)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Management Involvement (MIN)
Corporate Mission (COM)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Management Commitment (MAC)
Corporate Mission (COM)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Strategy & Policy Development (SPD)

b) ***Management Involvement*** versus *other sub-criteria*

Increasing Importance ← → *Increasing Importance*

Management Involvement (MIN)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Management Commitment (MAC)
Management Involvement (MIN)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Strategy & Policy Development (SPD)

c) ***Management Commitment*** versus ***Strategy & Policy Development***

Increasing Importance ← → *Increasing Importance*

Management Commitment (MAC)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Strategy & Policy Development (SPD)

Q.4 What is the relative importance amongst the listed sub-criteria within the ***Results Orientation*** criterion that facilitates strategy formulation and performance measures in your organisation?

a) ***Customer Focus*** versus *other sub-criteria*

	Increasing Importance ←									→ *Increasing Importance*								
Customer Focus (CUF)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Financial Results (FIR)
Customer Focus (CUF)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Non-financial Results (NFR)
Customer Focus (CUF)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Organisational Effectiveness (ORE)
Customer Focus (CUF)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Society Responsibilities (SOR)

b) ***Financial Results*** versus *other sub-criteria*

	Increasing Importance ←									→ *Increasing Importance*								
Financial Results (FIR)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Non-financial Results (NFR)
Financial Results (FIR)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Organisational Effectiveness (ORE)
Financial Results (FIR)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Society Responsibilities (SOR)

c) ***Non-financial Results*** versus *other sub-criteria*

	Increasing Importance ←									→ *Increasing Importance*								
Non-financial Results (NFR)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Organisational Effectiveness (OEF)
Non-financial Results (NFR)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Social Responsibilities (SOR)

d) ***Organisational Effectiveness*** versus ***Social Responsibilities***

	Increasing Importance ←									→ *Increasing Importance*								
Organisational Effectiveness (OEF)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Social Responsibilities (SOR)

Q.5 What is the relative importance amongst the listed sub-criteria within the ***Management by Process*** criterion that facilitates strategy formulation and performance measures in your organisation?

a) ***Product & Service Processes*** versus *other sub-criteria*

Increasing Importance ← → *Increasing Importance*

Product & Service Processes (PSP)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Sharing of Information (SIN)
Product & Service Processes (PSP)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Sharing of Knowledge (SKN)
Product & Service Processes (PSP)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Implementation of Strategy & Policy (ISP)

b) ***Sharing of Information*** versus *other sub-criteria*

Increasing Importance ← → *Increasing Importance*

Sharing of Information (SIN)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Sharing of Knowledge (SKN)
Sharing of Information (SIN)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Implementation of Strategy & Policy (ISP)

c) ***Sharing of Knowledge*** versus ***Implementation of Strategy & Policy***

Increasing Importance ← → *Increasing Importance*

Sharing of Knowledge (SKN)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Implementation of Strategy & Policy (ISP)

Q.6 What is the relative importance amongst the listed sub-criteria within the ***People Development & Involvement*** criterion that facilitates strategy formulation and performance measures in your organisation?

a) ***People Education, Training & Development*** versus *other sub-criteria*

Increasing Importance ← → *Increasing Importance*

People Education, Training & Dev't (ETD)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	People Well-being & Satisfaction (PWS)
People Education, Training & Dev't (ETD)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	People Involvement (PIN)
People Education, Training & Dev't (ETD)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	People Empowerment (PEM)

b) ***People Well-being & Satisfaction*** versus *other sub-criteria*

	Increasing Importance ←									→ *Increasing Importance*									
People Well-being & Satisfaction (PWS)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9		People Involvement (PIN)
People Well-being & Satisfaction (PWS)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9		People Empowerment (PEM)

c) ***People Involvement*** versus ***People Empowerment***

	Increasing Importance ←									→ *Increasing Importance*									
People Involvement (PIN)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9		People Empowerment (PEM)

Q.7 What is the relative importance amongst the listed sub-criteria within the ***Continuous Improvement*** criterion that facilitates strategy formulation and performance measures in your organisation?

a) ***Learning Culture*** versus *other sub-criteria*

	Increasing Importance ←									→ *Increasing Importance*									
Learning Culture (LEC)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9		Continuous Innovation (COI)
Learning Culture (LEC)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9		Review & Update Strategy/Policy (RUS)
Learning Culture (LEC)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9		Balancing & Satisfying Needs (BSN)

b) ***Continuous Innovation*** versus *other sub-criteria*

	Increasing Importance ←									→ *Increasing Importance*									
Continuous Innovation (COI)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9		Review & Update Strategy/Policy (RUS)
Continuous Innovation (COI)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9		Balancing & Satisfying Needs (BSN)

c) ***Review & Update Strategy/Policy*** versus ***Balancing & Satisfying Needs***

	Increasing Importance ←									→ *Increasing Importance*									
Review & Update Strategy/Policy (RUS)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9		Balancing & Satisfying Needs (BSN)

B.3: Comparison among Benefits

Q.8 What is the relative importance amongst the following intended or potential benefits that accompany with the integration of strategy formulation and performance measures in your organisation?

Make a pairwise comparison of benefits and circle the answer using the scale below:
1 = Equal; 3 = Moderate; 5 = Strong; 7 = Very Strong; 9 = Extreme

a) ***Optimised Value-added Operations*** versus *other benefits*

	Increasing Importance ←									→ *Increasing Importance*								
Optimised Value-Added Operations (OVO)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Improved Efficiency & Effectiveness (IEE)
Optimised Value-Added Operations (OVO)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Enhanced Corporate Image/Reputation (ECI)
Optimised Value-Added Operations (OVO)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Strengthening Loyalty & Morale (SLM)

b) ***Improved Efficiency & Effectiveness*** versus *other benefits*

	Increasing Importance ←									→ *Increasing Importance*								
Improved Efficiency & Effectiveness (IEE)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Enhanced Corporate Image/Reputation (ECI)
Improved Efficiency & Effectiveness (IEE)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Strengthening Loyalty & Morale (SLM)

c) ***Enhanced Corporate Image/Reputation*** versus ***Strengthening Loyalty & Morale***

	Increasing Importance ←									→ *Increasing Importance*								
Enhanced Corporate Image/Reputation (ECI)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Strengthening Loyalty & Morale (SLM)

Section C: Any other Comments

_____

_____

_____

A1.3 List of Sample Questions for Second Interviews

Strategy Formulation Practices, Strategy Determinants and Performance Criteria in Manufacturing Enterprises

This question list* *serves as an aid for facilitating the conduct of the second series of interviews. The interview process stresses on cross-fertilisation and sharing of views and opinions on the issues of strategy formulation and performance measures in manufacturing enterprises.*

Section A: General information

Name of Organisation: _____

Name of Participant: _____

Position and/or Job Title: _____

Years of Service in Position: _____

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*Remarks:

1. *The list contains three sections of questions. Section A is a common for all participants acquiring basic information about themselves and their organisations.*
2. *Section B acquires participants' intent on the prioritisation of strategy choices, whereas Section C verifies their views on strategy determinants and performance criteria, design of measurement systems, and problems in manufacturing enterprises.*
3. *The target participants for Section B questions are the recent winners or certificate of merit holders of the Hong Kong Award for Industry, and for Section C are industry experts and representatives from government departments.*

Section B: Strategy Formulation Practices

B.1 Please comment on the following strategy choices and indicate their order of importance to your organisation.
("1" means the first and "5" means the fifth)

1. Product (or service) quality improvement
2. New product development
3. Market development
4. Product modification
5. Importing Technology/Strengthening R&D
6. Staff education and training

B.2 What are your organisation's practices to improve product (or service) quality?

1. Formulation of a clear long-term strategy for continuous improvement, integrated with other key business strategies, departmental policies, and objectives.
2. Definition and communication of a common organisational definition of quality and quality improvement.
3. Selection of an approach to quality improvement
4. Identification of the organisations and people (internal and external) who can be sources of advice on quality improvement
5. Identification of stages of improvement activity, taking into account the starting point of the organisation, the motivation for continuous improvement and the tools that may be applicable.
6. Recognition of executive leadership, tangible commitment, and support as being crucial at all stages.
7. Development and communication of vision and mission statements that are concise and understandable to all employees.

B.3 Which of following have been used for the development of quality management systems and practices in your organisation?

1. Identification of the tools and techniques applicable at different stages of the process of continuous improvement.
2. Development of the appropriate type of training in the use of tools and techniques, targeted at the right people.
3. Consideration of the use of formal quality systems, if one is not in place.
4. Identification and implementation of other systems and standards that may be required by customers, legislation, or in order to compete.
5. Adoption of process analysis and improvement as a continual part of the organisation's quality improvement process.

B.4 How does your organisation identify and translate the voices of customers into performance measures such that improvement can be built upon?

1. Identification and definition of key internal and external performance measures to assess the progress being made and to ensure customer satisfaction.
2. Discussion with customers, about expected performance, needs, and expectation with respect to a variety of techniques.
3. Consideration of benchmarking, once the organisation has taken some steps down the journey of continuous improvement.

4. Consideration of various means for communication of success, and the development of methods for recognising the efforts of teams and individuals.
5. Consideration of linking rewards to continuous improvement activities and results.
6. Utilisation of some means of assessing the progress toward world-class performance.

B.5 How does your organisation cultivate the company culture conducive to continuous improvement?

1. Assessment of the current status of organisational culture, before developing and implementing for change.
2. Recognition of the ongoing nature of culture change, rather than a prerequisite for continuous improvement.
3. The development of plans for change that enable it to take place in a consistent and incremental manner.
4. The recognition of the role of people within the organisation.
5. Identification of the interrelationships of activities, and the way in which they contribute to quality within the organisation in order to minimize conflict.
6. Identification of factors that indicate continuous improvement has started to change culture.

B.7 What are the reasons underpinning new product development, product modification and advancement in your organisation?

For example: rapidly developing technologies, new and fierce competition, and radically shifting marketplaces

B.8 What are the techniques and procedures being employed in new product development, product modification and advancement in your organisation?

For example: Idea generation: focus groups with customers, market research to determine customer need areas, using the sales force to actively solicit ideas from customers, developing relationships with lead users, and utilising concept of concurrent engineering.

B.9 What kinds and characteristics of activities are deriving from new product development, product modification and advancement in your organisation?

For example: Project management of product development, including tasks and procedures for taking a new product from concept to launch; Teamworking and project organisation; Transfer from design to manufacturing and distribution; Industrial design

B.10 How does your organisation evaluate the success of new product development and product modifications/advancement?

For example: Success rates; % of complete developed new product; time to market; resource allocation; % of profitable new product

B.11 Which of the following does your organisation adopt to develop new markets and/or expand the existing markets?

For example: Exporting; Licensing; Franchising; Subcontracting; Co-operation agreement; Joint venture (e.g. contractual, equity); Turnkey contract; Wholly owned subsidiaries

B.12 Has your organisation established procedures for market entry development? If so, what are the procedures?

B.13 How does your organisation set a technology and/or R&D policy?

1. What is to be done in technology?
2. What technological capacity is necessary?
3. Create the capability it needs: Yes/no, explain how?
4. Calculate degree of risk involved if the analysis is in error: Yes/no, explain how?
5. Make a long-range forecast: Yes/no, explain how?
6. Develop a five-year operating plan: Yes/no, explain how?

B.14 Which areas are in a high priority of importing technology or R&D for your organisation? Elaborate the reasons.

B.15 Are there any department, division, and/or delegated person(s) responsible for people training and development in your organisation? If so, what are their main functions and responsibilities?

B.16 Please comment on the current provision of people training and development in your organisation.

For example: Matching organisational culture; Management style; Motivation; Knowledge; Affective (e.g. attitude and feeling); Interpersonal skills; Personal growth; Percentage of utilisation of training resources (i.e. workers, operators, supervisors, middle management, and top management)

B.17 Any other factors, considerations and comments: (e.g. business environment, government policy, industry and strategy trends, and technology, etc)

End of Section B

Section C: Strategy Determinants and Performance Criteria

C.1 What are your views and suggestions with regards to the following strategy determinants and performance criteria and their sub-elements in local manufacturing sectors?

1. Leadership and Constancy of Purposes (including Corporate Mission, Management Involvement, Management Commitment, and Strategy and Policy Development)

2. Results Orientation (including Customer Focus, Financial Results, Non-financial Results, Organisational Effectiveness, and Social Responsibilities)

3. Management by Processes (including Product and Service Processes, Sharing of Information, Sharing of Knowledge, and Implementation of Strategy and Policy)

4. People Development (including Education, Training and Development, People Well-being and Satisfaction, People Involvement, and People Empowerment)

5. Continuous Improvements (including Learning Culture, Continuous Innovation, Review and Update of Strategy/Policy, and Balancing and Satisfying Needs)

6. Others (e.g. Business Environment, Government Policy, Industry and Strategy Trends, Technology, etc)

C.2 What are your views and suggestions with regards to the design of performance measurement systems for manufacturing enterprises?

1. The competitive capability being measured (e.g. cost, quality, flexibility, delivery reliability, or speed)
2. Data source (i.e. internal or external)
3. Data type (i.e. objective or subjective)
4. Reference (i.e. benchmark or self-referenced)
5. Process orientation (i.e. input or outcome)

C.3 What are your views and suggestions on key performance measures and/or indicators for tracking progress relative to any action(s) and/or improvement plan(s) in manufacturing enterprises?

1. Main areas (e.g. financial and non-financial, customers and users, processes and products/services, organisational and individual learning, etc)
2. Performance owners/holders (e.g. management, sub-ordinates, etc)
3. Indicators and bases of measures (e.g. qualitative, quantitative, etc)

C.4 What are your views and suggestions with regard to the barriers and/or obstacles that may hinder the integration or alignment of strategy formulation with performance measures in manufacturing enterprises?

1. Contextual issues (e.g. The need for a highly developed information system; Time and expense required; Lack of leadership and resistance to change)

2. Process issues (e.g. Vision and strategy were not actionable; Difficulties in evaluating the relative importance of measures; Problems of identifying true 'drivers'; Strategy was not linked to resource allocation; Goals were negotiated rather than based on stakeholder requirements; State of the art improvement methods were not used; Striving for perfection undermined success)

3. Content issues (e.g. Strategy was not linked to department, team and individual goals; Large number of measures diluted the overall impact; Metrics were too poorly defined; The need to quantify results in areas that are more qualitative in nature)

C.5 Any other factors, considerations and comments:

_____

_____

_____

End of Section C

Appendix 2:

Theoretical and Axiomatic Foundations of Analytic Hierarchy Process

A2.1 About the Analytic Hierarchy Process

The methodology proposed for the first series of interviews of this research is analytic hierarchy process (AHP). The process was developed by Saaty in the late sixties and early seventies, has already been applied to a wide range of complex decision problems (Saaty (1977; 1994a,b, 2000).

The methodology is described by Saaty and Vargas (1991, p.14) as a
"*... multi-objective, multi-criteria decision-making approach that employs a pair-wise comparison procedure to arrive at a scale of preferences among a set of alternatives. To apply this approach, it is necessary to break down a complex, unstructured problem into its component parts, and arrange these parts, or variables, into a hierarchic order*".

The essential features of the method are captured in its name:

- '*Analytic*' means that the object of the decision is broken down into criteria. Both quantitative and qualitative criteria can be used to compare the available options and the criteria can be weighted. The overall assessment of the possibilities is found by linear algebra.
- '*Hierarchy*' refers to the manner in which the criteria, relevant environmental factors and the alternatives are treated. AHP always uses a number of different hierarchal levels and attributes the different elements of the problem to them.
- '*Process*' indicates that the solution to complex decision making problem is achieved through a systematic sequence of steps.

The AHP procedure is based on three principles corresponding to the steps described below: decomposition of a complex unstructured problem, comparative judgments about its components, and synthesis of priorities derived from the judgments (see also Sub-section 5.5.1 of *Chapter 5*).

The AHP methodology can be a useful tool for choice of a strategic option:

- Through the shared process of modeling the decision problem, a collective view is established, both of the different relevant factors and of their dependencies
- As the weighing for criteria and assessment of the alternatives is carried out systematically in a number of steps, differences in assessment will be revealed. Where these are not resolved through discussion, average values can be used.
- Inconsistencies in evaluations of individuals or groups can be revealed by the method and rejected.

A2.2 Theoretical Foundations of AHP

In order to synthesise the local priorities throughout the hierarchy and compute the global priorities of the alternatives, the principle of hierarchic composition is applied. The local priorities are multiplied by the corresponding criterion weight, and the results are summed up to obtain the global priority of the alternative with respect to the goal stated at the top level.

Thus,

$$A_l = \sum_{m=1}^{M} a_{lm} v_m \qquad \text{with} \sum_{l=1}^{L} a_{lm} = 1 \qquad \text{and} \qquad \sum_{m=1}^{M} v_m = 1$$

where,

A_l	=	final priority of alternative l
a_{lm}	=	priority of alternative l with respect to criterion m
v_m	=	weight of criterion m
l	=	(1, . . . L)
m	=	(1, . . . M)

The first major task in AHP is estimating the weights of a set of elements (e.g. criteria or alternatives) from a matrix of pair-wise comparisons $A = (a_{ij})$ that is positive and reciprocal. The matrix is given as:

$$A = \begin{bmatrix} a_{11} & a_{12} & . & a_{1n} \\ a_{21} & a_{22} & . & a_{2n} \\ . & . & . & . \\ a_{n1} & a_{n2} & . & a_{nn} \end{bmatrix}$$

where,

$a_{ij} = 1/a_{ij}$ for all $i,j = 1, 2, \ldots, n.$

A vector of weights or priorities $w = (w_1, w_2, \ldots, w_n)$ is then computed. Note that by using ratio scales, the estimated weights are only unique up to multiplication by a positive constant. That is, w is equivalent to cw where $c > 0$. For convenience, w is typically normalised so that it adds up to 1 or 100. If the judgments were perfectly consistent, i.e. $a_{ik}a_{kj} = a_{ij}$, then the entries of the matrix A would contain no errors, and could be expressed as $a_{ij} = w_i/w_j$.

To see this last result, note that:

$$a_{ik}a_{kj} = w_i w_k / w_k w_j = w_i / w_j = a_{ij} \qquad \text{for all } i, j, k = 1, 2, \ldots, n.$$

In this case, simply normalise any column j of A to yield the final weights:

$$w_i = a_{ij} / \sum_{k=1}^{n} a_{kj}, \qquad \text{for all } i = 1, 2, \ldots, n.$$

However, errors in judgment are common, and, therefore, the final result using column normalisation would depend on which column was chosen.

Saaty (1977, 1994a,b) suggests the eigenvector method for estimating the weights when there are errors in judgment. The method computes w as the principal right eigenvector (or Perron right vector) of the matrix A:

$$A_w = \lambda_{max} w,$$

where λ_{max} is the maximum eigenvalue (or Perron root) of the matrix, or

$$w_i = \left(\sum_{j=1}^{n} a_{ij} w_j \right) / \lambda_{max} \qquad \text{for all } i = 1, 2, n.$$

The eigenvector method is a simple averaging process by which the final weights w are computed as the average of all possible ways of comparing the alternatives. Thus, the eigenvector is a 'natural' method for computing the weights.

The eigenvector method also yields a natural measure for inconsistency. As shown by Saaty (1977, 1994a,b), λ_{max} is always greater than or equal to n for positive, reciprocal matrices, and is equal to n if, and only if, A is a consistent matrix. Thus λ_{max} - n provides a useful measure of the degree of inconsistency. Normalising this measure by the size of the matrix, Saaty defines the consistency index (CI) as:

$$CI = (\lambda_{max,} - n)/(n - 1)$$

For each size of matrix n, random matrices are generated, and their mean CI value, called the random index (RI), is computed. These values are illustrated in Table A2.1.

Table A2.1 Random inconsistency index

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.48	1.56	1.57	1.59

Source: Based on Saaty (1994a)

Using these values, the consistency ratio is defined as the ratio of CI to the RI; thus, CR is a measure of how a given matrix compares to a purely random matrix in terms of their CI's. Therefore

$$CR = CI/RI$$

A value of the CR ≤ 0.1 is typically acceptable, but at larger values, the decision maker must reduce the inconsistency by revising judgments.

Computing the principal right eigenvector is accomplished by raising the matrix A to increasing powers k and then normalising the resulting system:

$$\lim_{k \to \infty} A^k e / e^T A^k e$$

where,

$$e = (1, 1, \ldots, 1).$$

The process converges in a few iterations. The reasoning behind this approach and its interpretation as an averaging process is found in Harker and Vargas (1987). Once the weights are computed by raising the matrix A to increasing powers k and normalising the resulting system, the consistency measure can be computed as follows:

$$CR = [(\lambda_{max} - n)/(n - 1)]/RI_n$$

where,

$$\lambda_{max} = \left(\sum_{j=1}^{n} a_{ij} w_j \right) / w_i$$

A2.3 Axiomatic Foundations of AHP

This set of axioms was first defined by Saaty (1986) and is further described in Harker and Vargas (1987). These axioms describe the two basic tasks in AHP; first, formulating and solving the problem as a hierarchy (i.e. axioms 3 and 4), and second, eliciting judgments in the form of pair-wise comparisons (i.e. axioms 1 and 2).

The axioms are paraphrased for clarity as shown below. For their full mathematical form, see Saaty (1986), Harker and Vargas (1987), and Saaty and Vargas (1991).

Axiom 1:
Given any two alternatives (or sub-criteria) i and j out of the set of alternatives A, the decision maker is able to provide a pair-wise comparison a_{ij} of these alternatives under any criterion c from the set of criteria C on a ratio scale that is reciprocal, i.e.,

$$a_{ij} = 1/a_{ij}, \qquad \text{for all } i, j \in A.$$

Axiom 2:
When comparing any two alternatives $i,j \in A$, the decision maker never judges one to be infinitely better than another under any criterion $c \in C$, i.e.,

$$a_{ji} \neq \infty \qquad \text{for all } i, j \in A.$$

Axiom 3:
The decision problem can be formulated as a hierarchy.

Axiom 4:
All criteria and alternatives that have an impact on the given decision problem are represented in the hierarchy. That is, the decision maker's intuition pertaining to the criteria and alternatives must be fully represented (or excluded) in the structure, and this intuition must be assigned compatible priorities.

Appendix 3:

A Sample Score-Matrix Questionnaire and Scoring Record Sheet for Self-Assessment Exercises

List of Annexes:

A3.1 A Sample Self-Assessment Questionnaire

I. General Descriptions:

This questionnaire was developed for explaining the concepts and focal areas to be addressed in the design and revision of any self-assessment instrument in individual users. This is not a standard questionnaire designed for any organisations.

The questionnaire contains 137 statements or items in five categories of self-assessment criteria and twenty-one sub-criteria. The first four categories of criteria (i.e., Enablers) have twenty-three statements each, and the last criterion (i.e., Results) contain 45 items.

You are asked to assess whether there are approaches in place and do they capture data that reflect the performance results of some of the approaches. All statements or items use a 10-point numerical scale format, and the ratings range from 1 ("Not at all" and/or "least significant") to 10 ("To a very large extent" and/or "most significant").

II. Instructions

1) Circle the numbers in 10-point numerical scale that can represent mostly your views on the performance status of individual statements or items of criteria.
2) Add the points you gave for all statements or items in individual criteria section, calculate their mean points and put the values in the score boxes given.
3) Repeat the second step until you complete the self-assessment exercise for all criteria sections.
4) Transfer all the point values from the score boxes to the scores summary sheet (as given in *Annex 3.2*)
5) Compute the overall performance index for this self-assessment exercise according to the instructions of the score summary sheet.

III. Scoring

The maximum possible score of the overall performance index is 1,000 (including the maximum Enablers score of 735 and the maximum Results score of 265). Attaining an overall performance index of 800 scores or above can be regarded as excellent and 600 score or above as good, respectively.

1. Leadership and Constancy of Purpose

1(a) Corporate Mission, Vision and Values

1) Senior management defines corporate mission, vision and values for the organisation. 2) The mission is specific to the organisation. 3) Senior management define a vision based on customer needs and the capabilities of the organisation. 4) The vision is understandable to stakeholders (including management, employees, customers, shareholders, and the public).	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10

1(a) Sub-total: ☐ **/ 4 = Mean:** ☐ **x 10 =** ☐ **%**

1(b) Management Involvement

5) Senior management involves in the evaluation of performance measures of the organisation (including individial functions and work units). 6) Senior management involves in the design of improvement programmes for the organisation 7) Senior management attends the meetings and activities of different committees, teams and task forces. 8) Senior executives and managers participate the training and development courses of the organization. 9) Senior management takes a leading role in safeguarding the performance of the organisation	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10

1(b) Sub-total: ☐ **/ 5 = Mean:** ☐ **x 10 =** ☐ **%**

1(c) Management Commitment

10) Senior management communicate the corporate values, and directions to stakeholders.	1 2 3 4 5 6 7 8 9 10
11) Senior management evaluates and improves the effectiveness of the communication methods.	Not at all — To a very Large extent
12) Senior management evaluates their leadership with respect to the organisation performance and stakeholders' feedback.	1 2 3 4 5 6 7 8 9 10
13) Senior management identifies the needs, priorities and criteria for performance improvement.	1 2 3 4 5 6 7 8 9 10
14) Senior management identifies actions taken to fix problems.	1 2 3 4 5 6 7 8 9 10
15) Senior management listens to employees' ideas of implementation.	1 2 3 4 5 6 7 8 9 10
16) Senior management communicates improvement actions to people.	1 2 3 4 5 6 7 8 9 10
17) Senior management reviews the meeting of goals in the area of public responsibility and corporate citizenship.	1 2 3 4 5 6 7 8 9 10

1(c) Sub-total: ☐ **/ 8 = Mean:** ☐ **x 10 =** ☐ **%**

1(d) Strategy and Policy Development

18) The development of strategy and policy covers different functions (such as financial, markets/customers, products/services, human resources, and research and development).	1 2 3 4 5 6 7 8 9 10
19) The process of strategy and policy development is flexible in dealing with changes in business environment.	Not at all — To a very Large extent
20) The organisation identifies and success factors in accordance with the corporate vision	1 2 3 4 5 6 7 8 9 10
21) The organisation takes into account the financial and non-financial risks.	1 2 3 4 5 6 7 8 9 10

22) The organisation takes into account the strength(s) and weakness(es) of the supplier(s) and.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
23) The organisation conducts research (e.g. on customer satisfaction, product/service, supplier/ partner, and financial/non-financial performance)	1 2 3 4 5 6 7 8 9 10

1(d) Sub-total: ☐ **/ 6 = Mean:** ☐ **x 10 =** ☐ **%**

2. Management by Process

2(a) Product and Service Processes

1) The business processes (i.e., design, production and delivery of products and services) are consistent with the corporate goals and strategies.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
2) The organisation determines business requirements (e.g. using inputs from customers, suppliers and/or partners.	1 2 3 4 5 6 7 8 9 10
3) The organisation defines performance indicators (e.g., internal customer satisfaction, process, output, quality, and operational requirements) for the business processes.	1 2 3 4 5 6 7 8 9 10
4) The organisation coordinates the business processes to prevent defects and rework.	1 2 3 4 5 6 7 8 9 10
5) The organisation defines the support processes for daily operations.	1 2 3 4 5 6 7 8 9 10
6) The organisation uses in-process measure (e.g. real-time input from customer, supplier and partner)	1 2 3 4 5 6 7 8 9 10
7) The organisation manages the business and support processes (e.g. with respect to strategic plans, customer requirements and capabilities, involvement of right personnel)	1 2 3 4 5 6 7 8 9 10

2(a) Sub-total: ☐ **/ 7 = Mean:** ☐ **x 10 =** ☐ **%**

2(b) Sharing of Information

8) Employees, suppliers, partners, and customers, etc can share the types of data and information that are allowed to access.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
9) The organisation handles its data and information (e.g. focusing on integrity, reliability, accuracy, timeliness, security and confidentiality).	1 2 3 4 5 6 7 8 9 10
10) The organisation reviews the sharing of data and information with business and operational needs.	1 2 3 4 5 6 7 8 9 10
11) The organisation analyses performance data collected from different areas to determine its performance.	1 2 3 4 5 6 7 8 9 10
12) The organisation communicates the performance data to work groups and functional level operations.	1 2 3 4 5 6 7 8 9 10
13) The organisation presents performance data that is easy to read and understand	1 2 3 4 5 6 7 8 9 10

2(b) Sub-total: [ ] **/ 6 = Mean:** [ ] **x 10 =** [ ] **%**

2(c) Sharing of Knowledge

14) The organisation gathers and shares various data sources to support daily operations and decision-making.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
15) The organisation shares the results of performance measures of the business and support processes.	1 2 3 4 5 6 7 8 9 10
16) The organisation uses benchmark data as stimuli to enhance improvements.	1 2 3 4 5 6 7 8 9 10
17) The organisation encourages its functions, work units, and locations to communicate successes with each other.	1 2 3 4 5 6 7 8 9 10
18) The organisation establishes a system (or mechanism) for sharing improvements among its functions and work units	1 2 3 4 5 6 7 8 9 10

2(c) Sub-total: [ ] **/ 5 = Mean:** [ ] **x 10 =** [ ] **%**

2(d) Implementation of Strategy and Policy

19) The organisation deploys strategies and policies with action plans. 20) The organisation integrates the planning with resource allocation processes. 21) The organisation establishes a feedback system on the adequacy of the resource allocation. 22) The organisation communicate the implementation results within itself and, if appropriate, outside to the suppliers and partners. 23) The organisation sets the implementation results as the basis for projections of continuous improvement	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10

2(d) Sub-total: ☐ **/ 5 = Mean:** ☐ **x 10 =** ☐ **%**

3. People Development and Involvement

3(a) People Education, Training, and Development

1) The organisation identifies specific competencies needed in recruiting and selecting new employees. 2) The organisation identifies the knowledge and skills required by employees to function the work system. 3) The organisation addresses the needs of people development 4) The organisation implements training and education schemes to meet personal needs (e.g. development, learning and career progression). 5) The organisation ensures the training and education schemes are supported with appropriate coaching and reinforcement. 6) The organisation evaluates the provisions of people education and training.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10

3(a) Sub-total: ☐ **/ 6 = Mean:** ☐ **x 10 =** ☐ **%**

3(b) People Well-being and Satisfaction

7) The organisation sets targets for workplace health, safety, and ergonomic to safeguard work environment.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
8) The organisation analyses the causes of work accidents and priorities for improving the work environment	1 2 3 4 5 6 7 8 9 10
9) The organisation promotes health initiatives that tailor the needs of different cultures and locations of employee groups.	1 2 3 4 5 6 7 8 9 10
10) The organisation uses formal and informal assessment methods to measure people well-being and satisfaction.	1 2 3 4 5 6 7 8 9 10
11) The organisation develops corrective actions for dealing with problems related to people well-being and satisfaction.	1 2 3 4 5 6 7 8 9 10

3(b) Sub-total: ☐ **/ 5 = Mean:** ☐ **x 10 =** ☐ **%**

3(c) People Involvement

12) The organisation involves employees and other stakeholders in strategy formulation and setting of its future directions.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
13) The organisation involves employees and other stakeholders in designing the business and support processes	1 2 3 4 5 6 7 8 9 10
14) The organisation discusses with employees the performance indicators of their job and work design.	1 2 3 4 5 6 7 8 9 10
15) The organisation encourages employees to take part in improving people well-being and satisfaction	1 2 3 4 5 6 7 8 9 10

3(c) Sub-total: ☐ **/ 4 = Mean:** ☐ **x 10 =** ☐ **%**

3(d) People Empowerment

16) The organisation ensures flexibility, rapid response, and people learning in customer, operational and business requirements	1 2 3 4 5 6 7 8 9 10 (Not at all — To a very Large extent)
17) Employees understand how their jobs contribute to helping achieve organisational goals.	1 2 3 4 5 6 7 8 9 10
18) Employees understand the values and expectations of the organisation.	1 2 3 4 5 6 7 8 9 10
19) The organisation enourages employees to suggest and implement ideas for improving the organisation's practices.	1 2 3 4 5 6 7 8 9 10
20) The organisation promotes open communication and cooperation between departments and locations.	1 2 3 4 5 6 7 8 9 10
21) The organisation drives improvement using compensation plan.	1 2 3 4 5 6 7 8 9 10
22) The organisation reinforces people improvement and learning with corporate objectives.	1 2 3 4 5 6 7 8 9 10
23) The organisation shows a high level of trust in people involved in strategy formulation and performance measures	1 2 3 4 5 6 7 8 9 10
3(d) Sub-total: ☐	**/ 8 = Mean:** ☐ **x 10 =** ☐ **%**

4. Continuous Improvement

4(a) Learning Culture

1) The organisation uses the customer requirements data for product and service planning, and business development	1 2 3 4 5 6 7 8 9 10 (Not at all — To a very Large extent)
2) Senior management creates a learning culture in the organisation.	1 2 3 4 5 6 7 8 9 10
3) The organisation translates future trends into customer requirements.	1 2 3 4 5 6 7 8 9 10
4) The organisation reviews and its approach to learn from customers and markets.	1 2 3 4 5 6 7 8 9 10

5) The organisation reviews and improves the methods of identification of customers and market groups.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
6) The organisation monitors, the business and support processes to safeguard its performance.	1 2 3 4 5 6 7 8 9 10
7) The organisation analyses the causes of customer complaints to make changes in the business and support processes	1 2 3 4 5 6 7 8 9 10
4(a) Sub-total: ☐ **/ 7 = Mean:** ☐ **x 10 =** ☐ **%**	

4(b) Continuous innovation

8) The organisation evaluates and pioneers the use of new technologies (e.g., Internet systems and technology) in the business and support processes.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
9) The organisation performs quality assurance practices and performance audits to minimise warranty and rework cost.	1 2 3 4 5 6 7 8 9 10
10) The organisation employs methods (e.g., process modeling) to identify opportunities for continuous improvement in the business and support processes.	1 2 3 4 5 6 7 8 9 10
11) The organisation uses various data sources (e.g., field data, competitor or benchmark data, and statistical data) to identify opportunities for performance improvement	1 2 3 4 5 6 7 8 9 10
4(b) Sub-total: ☐ **/ 4 = Mean:** ☐ **x 10 =** ☐ **%**	

4(c) Review and update of strategy/policy

12) The organisation measures the implementation of strategy/ policy, and benchmark the results with competitors	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
13) The organisation reviews and updates strategies/policies with respect to corporate goals.	1 2 3 4 5 6 7 8 9 10
14) The organisation reviews the common requirements and unique expectation of customers	1 2 3 4 5 6 7 8 9 10
15) The organisation makes performance projections with respect to long-term strategies.	1 2 3 4 5 6 7 8 9 10
16) The organisation uses in-process measures and internal customer feedback as stimuli to improving strategies/policies	1 2 3 4 5 6 7 8 9 10

4(c) Sub-total: [ ] **/ 5 = Mean:** [ ] **x 10 =** [ ] **%**

4(d) Balancing and Satisfying Stakeholders' Needs

17) The organisation uses the review findings and feedback to improve the management leadership system.	1 2 3 4 5 6 7 8 9 10 Not at all — To a very Large extent
18) The organisation uses different sources of data and information to determine stakeholders' needs.	1 2 3 4 5 6 7 8 9 10
19) The organisation establishes a tracking (or similar) system on stakeholders' complaints and compliments.	1 2 3 4 5 6 7 8 9 10
20) The organisation uses a variety of data and information sources on competitors' customer satisfaction levels.	1 2 3 4 5 6 7 8 9 10
21) The organisation defines performance standards and indicators.	1 2 3 4 5 6 7 8 9 10
22) The organisation improves the channels for customers to access products or services information.	1 2 3 4 5 6 7 8 9 10
23) The organisation develops action plans for identifying and improving stakeholders' satisfaction and needs	1 2 3 4 5 6 7 8 9 10

4(d) Sub-total: [ ] **/ 7 = Mean:** [ ] **x 10 =** [ ] **%**

5. Results Orientation

5(a) Customer-Focus

1) Decreasing time to market.	1 2 3 4 5 6 7 8 9 10
2) Willingness to purchase and repurchase.	1 2 3 4 5 6 7 8 9 10
3) Maintain a long-lasting good relationship.	1 2 3 4 5 6 7 8 9 10
4) High frequency and value of orders.	1 2 3 4 5 6 7 8 9 10
5) Achieve customer retention.	1 2 3 4 5 6 7 8 9 10
6) Provide positive referral about the organisation.	1 2 3 4 5 6 7 8 9 10
7) Decrease in number of complaints.	1 2 3 4 5 6 7 8 9 10
8) Increase in number of compliments.	1 2 3 4 5 6 7 8 9 10
9) Achieve quality (reliability, usability, safety, etc).	1 2 3 4 5 6 7 8 9 10
10) Achieve service level performance	1 2 3 4 5 6 7 8 9 10

5(a) Sub-total: [ ] **/ 10 = Mean:** [ ] **x 10 =** [ ] **%**

5(b) Financial Results

11) Achieve return on investment.	1 2 3 4 5 6 7 8 9 10
12) Achieve return on equity.	1 2 3 4 5 6 7 8 9 10
13) Achieve utilisation of assets.	1 2 3 4 5 6 7 8 9 10
14) Increase gross profit.	1 2 3 4 5 6 7 8 9 10
15) Increase volume of sales.	1 2 3 4 5 6 7 8 9 10
16) Meet budgets.	1 2 3 4 5 6 7 8 9 10

17) Decrease maintenance cost.	1 2 3 4 5 6 7 8 9 10
18) Reduce compensation claims	1 2 3 4 5 6 7 8 9 10

5(b) Sub-total: ____ **/ 8 = Mean:** ____ **x 10 =** ____ **%**

5(c) Non-financial Results

19) Increase in market share.	1 2 3 4 5 6 7 8 9 10
20) Develop new products and geography market.	1 2 3 4 5 6 7 8 9 10
21) Meet training and development objectives.	1 2 3 4 5 6 7 8 9 10
22) Achieve low absenteeism and turnover rate.	1 2 3 4 5 6 7 8 9 10
23) Share knowledge, techniques, and information.	1 2 3 4 5 6 7 8 9 10
24) Improve on-the-job performance.	1 2 3 4 5 6 7 8 9 10
25) Utilise facilities and equipments.	1 2 3 4 5 6 7 8 9 10
26) Achieve positive culture change	1 2 3 4 5 6 7 8 9 10
27) Strengthen people loyalty and morale	1 2 3 4 5 6 7 8 9 10
28) Improve company reputation	1 2 3 4 5 6 7 8 9 10

5(c) Sub-total: ____ **/10 = Mean:** ____ **x 10 =** ____ **%**

5(d) Organisational Effectiveness

29) Increase use of new technologies	1 2 3 4 5 6 7 8 9 10
30) Avhieve product/process yield.	1 2 3 4 5 6 7 8 9 10

31) Reduce inventory turnover	1 2 3 4 5 6 7 8 9 10
32) Improve operational efficiency (e.g. flexibility, delivery, and productivity)	1 2 3 4 5 6 7 8 9 10
33) Reduce defect rates, scraps, wastes or reworks.	1 2 3 4 5 6 7 8 9 10
34) Reduce cycle times, lead times and set-up times.	1 2 3 4 5 6 7 8 9 10
35) Reduce incoming inspections and quality control.	1 2 3 4 5 6 7 8 9 10
36) Improve business and support processes	1 2 3 4 5 6 7 8 9 10
37) Achieve supplier/vendor performance.	1 2 3 4 5 6 7 8 9 10
38) Achieve value-added operations	1 2 3 4 5 6 7 8 9 10

5(d) Sub-total: [ ] **/10 = Mean:** [ ] **x 10 =** [ ] **%**

5(e) Social Responsibilities

39) Achieve waste reduction and avoidance.	1 2 3 4 5 6 7 8 9 10
40) Increase uses of by-product.	1 2 3 4 5 6 7 8 9 10
41) Increase recycling of materials.	1 2 3 4 5 6 7 8 9 10
42) Reduce and prevent harmful operations or products.	1 2 3 4 5 6 7 8 9 10
43) Achieve performance in safety and environmental protection.	1 2 3 4 5 6 7 8 9 10
44) Increase involvement in communities.	1 2 3 4 5 6 7 8 9 10
45) Increase number of awards or compliments received	1 2 3 4 5 6 7 8 9 10

5(e) Sub-total: [ ] **/ 7 = Mean:** [ ] **x 10 =** [ ] **%**

End of the Questionnaire

A3.2 Scoring Record Sheet for Self-assessment Exercises

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)		x1.14=		2(a)		x1.82=		3(a)		x1.36=		4(a)		x2.17=	
Sub-criterion	1(b)		x2.00=		2(b)		x2.73=		3(b)		x3.64=		4(b)		x2.61=	
Sub-criterion	1(c)		x4.57=		2(c)		x2.73=		3(c)		x1.82=		4(c)		x2.17=	
Sub-criterion	1(d)		x2.29=		2(d)		x2.73=		3(d)		x3.18=		4(d)		x3.04=	
Scores Obtained:																

Note: 1) Assuming that the organisation can achieve 80 percent of scores in all sub-criteria from the self-assessment exercise

2) The score obtained is the arithmetic average of the % scores for the sub-criteria. If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)		x2.64=	
Sub-criterion	5(b)		x2.64=	
Sub-criterion	5(c)		x1.13=	
Sub-criterion	5(d)		x1.89=	
Sub-criterion	5(e)		x1.70=	
Scores Obtained:				

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes		x 0.175	=	
2. Management by Processes		x 0.110	=	
3. People Development		x 0.220	=	
4. Continuous Improvement		x 0.230	=	
Results Sub-criteria				
5(a) Customer Focus		x 0.265	=	
5(b) Financial Results		x 0.265	=	
5(c) Non-financial Results		x 0.265	=	
5(d) Organisational Effectiveness		x 0.265	=	
5(e) Social Responsibilities		x 0.265	=	

Total Score Points Obtained:

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.

2) Multiply each score by appropriate conversion factors to give the points obtained.

3) Add points obtained to each criterion to give total score points (i.e. the overall performance index).

Appendix 4:

Some Implications on Self-assessment Results in Accordance with SF/PM Criteria

Implications on Category 1 – Leadership and Constancy of Purposes

1(a) Corporate Mission, Vision and Values

1. An effective mission statement should define specific products or services, markets, and strategies that make the company unique.
2. Leaders monitor employee acceptance and adoption of vision and values using annual surveys, employee focus groups, and email questions.
3. Senior leaders communicate and reinforce corporate mission, vision and values (e.g., customer focus, customer satisfaction, and continuous improvement) throughout the organisation.
4. Example: the vision of Snapple beverages is to be the number three soft drink manufacturer. The company realises that it will never displace Coke and Pepsi from their number one and two positions in the market. This is an achievable and realistic vision statement.

1(b) Management Involvement

1. Senior leaders assume leadership and responsibility for performance by communicating, defining and motivating improvement initiatives and efforts in the organisation.
2. Senior leaders should actively participate in different areas, activities, and processes throughout the organisation. During the participation, senior leaders serve as a coach to educate employees who have difficulties in understanding the organisational objectives.

1(c) Management Commitment

1. Senior leaders review the effectiveness of their leadership (for example, seeking feedback at least annually from employees and peers using an upward evaluation), and take steps to improve.
2. Senior leaders conduct monthly reviews of organisational performance. This requires that subordinates conduct bi-weekly reviews and workers and work teams provide daily performance updates. Corrective action plans are developed to improve performance that deviates from planned performance.
3. Senior leaders promote the development of the human resources, invest on training and education and reward performance achievements
4. Senior leaders communicate the values in speeches, newsletters, training programs, meetings, reports, plans and various other ways in which the organisation conveys information to its employees.
5. For example, Motorola prints its corporate objective and key beliefs, goals, and initiatives on a laminated card the size of a credit card, which it hands out to all employees and anyone else who would like one.

1(d) Strategy and Policy Development

1. Senior leaders translate the corporate goals into strategy, policy and implementation plans.
2. Data on customer requirements, key markets, benchmarks, supplier and partner, human resource, and organisational capabilities are used to develop business plans.
3. There is information that future customers are projected to want more ability to order small lots of product that are more customisad to their specifications. Such information can be used to develop goals and strategies regarding small lot-size orders, and more flexibility in tailoring products to customer needs.
4. Best practices from other providers, competitors, or outside benchmarks are identified and used to provide better estimates of timelines.
5. For instance, McDonald's adopt a 3-1-Q planning system. This means three-year strategic plans, one-year operation plans, and quarterly reviews.

Implications on Category 2 – Management by Processes

2(a) Product and Service Processes

1. The organisation should determine which are the critical business and support processes for the design, production and delivery of products and services
2. The organisation should determine adequate points of control and monitoring of critical business and support processes.
3. Quality function deployment can be used to maintain a focus on the voice of the customer and convert customer requirements into product or service design, production and delivery.
4. Concurrent engineering is used to operate several processes (e.g., product and service planning, R&D, manufacturing, marketing, supplier certification) in parallel as much as possible, rather than operating in sequence. All activities are closely coordinated through effective communication and teamwork.
5. Research and development should be encouraged to work directly with customers and suppliers early in the new product development process.

2(b) Sharing of Information

1. The organisation should establish effective information systems and make decisions based on objective and reliable data.
2. All kinds of data, process steps, improvement suggestions, measures, monitoring progress, and evaluations should be documented and selectively controlled. In addition, the requested documents can be accessed easily.
3. To calibrate and maintain properly the inspection, test, and manufacturing process control equipment, it is essential that all relevant documents be available. The list of involved documents may include operating manuals, service manuals, drawings, specifications, schematics, bulletins, parts lists, standards, and instructions.
4. The organisation should share information and disseminates results of performance measurements to those who are involved.

2(c) Sharing of Knowledge

1. The organisation should utilise and prioritise the sharing of knowledge to improve business and support processes.
2. The use of competitive and comparative information is important to all organisation. The major premises are: (1) the organisation needs to know where it stands relative to competitors and to best practices; (2) comparative and benchmarking information often provides the impetus for significant improvement or change; (3) preparation for comparing performance information frequently leads to a better understanding of the processes and their performance.
3. Effective selection and use of competitive comparisons and benchmarking information require: (1) determination of needs and priorities; (2) criteria for seeking appropriate sources for comparisons – from within and outside the organisation's industry and markets; (3) use of data and information to set stretch

targets and to promote major improvements in areas most critical to the organisation's competitive strategy.

2(d) Implementation of Strategy and Policy

1. The organisation should collect a wide range of complete and accurate performance indicators that facilitate implementation of strategy and policy.
2. Plans and planning process itself are evaluated for accuracy and completeness. More often it needed to keep pace with changing business requirements.
3. The process most organisations use to select their strategies is to brainstorm a long list of possible approaches for achieving an objective, and then evaluating each possibility based on a variety of factors such as cost, risk, likelihood of success, and impact on other parts of the plan, etc.
4. Plans are followed to ensure that resources are deployed and redeployed as needed to support goals.
5. For example, AT&T Transmission Systems performs continuous process improvement by identifying what they call: "The Ten Most Wanted." These are ten process improvement efforts that are underway in the company at any one time. Each of the ten most wanted is linked to strategic business goals, and only ten projects are going at any one time, to help ensure that process improvement efforts are not too disjointed.

Implications on Category 3 – People Development and Involvement

3(a) People Education, Training and Development

1. The organisation should provide training to managers and employees with the knowledge and skills needed to perform their jobs and assignments.
2. Training may occur through developmental assignments (including mentoring and apprenticeship) within or outside the organisation.
3. Training may focus on the use of performance measures, skills standards, quality control methods, benchmarking, problem-solving processes, and performance improvement techniques.
4. Provide cross-training for the employees to increase existing skills, and give the organisation the flexibility to utilise employees in various tasks.
5. Employee satisfaction with courses is tracked and used to improve training content, training delivery, instructional effectiveness, and the effectiveness of supervisory support for the use of training on the job
6. For example, Sears uses a mural to depict their vision, and shows employees how their jobs can impact the company vision, and how they can avoid the failure of Sears. Every Sears employee is taken through a several hour training session to teach them about their role in helping the company make the right decisions and achieve the right results.

3(b) People Well-being and Satisfaction

1. The organisation should ensure support and resources are available for employees to contribute effectively to their career development needs, well-being and satisfaction.
2. To enhance satisfaction and well-being, example of services, facilities, activities, and other opportunities might include: counseling, career development, recreational and cultural activities, non-work-related education, day care, special personal leave, flexible work hours, outplacement, retirement benefits, and health insurance.
3. Satisfaction data are derived from employee focus groups, email data, employee satisfaction survey results, turnover, absenteeism, stress-related disorders, and other data that reflect employee satisfaction.
4. For example, a plant manager spends a couple of hours a week walking around the plant talking to people about their jobs and accomplishments.

3(c) People Involvement

1. The organisation should have a work system focusing on the following factors: work and job design, employee performance management, accomplishment of planning, identification of employee skills, and employee motivation.

2. The organisation should use uses teamwork to solve cross-functional problems and foster people participation and involvement.
3. There should be some regular meetings for employees to share their ideas, skills, and knowledge throughout the organisation.
4. For example, in a manufacturing enterprise, there are weekly department meetings where one team got to present their project to the others, for the purpose of sharing good ideas, and getting those who worked on the project some recognition from their peers.

3(d) People Empowerment

1. Senior leaders should empower subordinates by creating a collaborative and risk-taking and sharing working environment
2. Employees contribute to the performance objectives through both individual and team participation.
3. The organisation should involve and empower employees so as to bear on the decision-making process and increase the ownership employees feel in decisions that are made. In addition, reward and recognition systems should be established.
4. Human resource plans support strategic plans and goals. Plans show how the workforce will be developed to enable the organisation to achieve its strategic goals.
5. Key issues of training and development, hiring, retention, employee participation, involvement, empowerment, and recognition and reward are addressed as a part of the human resource plan. Appropriate measures and targets for each should be defined.

Implications on Category 4 – Continuous Improvement

4(a) Learning Culture

1. Senior leaders should promote a culture of learning and improvement in the organisation.
2. There are several effective listening and learning strategies:
   - Close monitoring of technological, competitive, societal, environmental, economic, and demographic factors that may bear on customer requirements, expectation, preferences, or alternatives;
   - Focus groups with demanding or leading-edge customers;
   - Training of frontline employees in customer listening;
   - Use of critical incidents in product or service performance or quality to understand key service attributes from the point of view of customers and frontline employees.
3. For example, Motorola invests a large percentage of their payroll costs in training. Motorola has created cultures where continuous learning is an expectation for everyone, and the company provides significant resources to make the learning available.

4(b) Continuous Innovation

1. The organisation should encourage continuous innovation and search opportunities for improvement.
2. Four approaches to evaluating and improving support processes are frequently used: (1) process analysis and research; (2) benchmarking; (3) use of alternative technology; and (4) use of information from customers of processes – within and outside the organisation.
3. The organisation should implement an information system that is suitable for the organisation business, size, and functions. The system should help control the design processes, such as documentation control, interface control, verification, design change control, product review, and product approval.

4(c) Review and Update of Strategy/Policy

1. The strategy and policy for business development should be reviewed and updated periodically. Data from competitors, key benchmarks, and/or past performance form a valid basis for comparison. The organisation needs to have valid strategies and goals in place to meet or exceed the planned levels of performance for these competitors and benchmarks.
2. Future plans and projections of performance consider new acquisition, optimum but secure growth, reducing costs through operational excellence processes, and anticipated research and development of innovations internally or among competitors. The accuracy of these projections is mapped and analyzed. Techniques to improve accuracy are developed and implemented

3. The performance projection should be based on information from different sources, such as customer expectation, benchmarks, business review, and organisation capabilities.
4. The organisation should also benchmark the competitors, best companies, and suppliers or partners. A cross-functional improvement team should be set-up to review and improve the support processes.

4(d) Balancing and Satisfying Stakeholders' Needs

1. An organisation should identify the customer market groups, the customer characteristics, product purchased, geographic areas or others.
2. The organisation should get customer expectation through several methods, such as comment cards, surveys, focus groups, hot lines, customer visits, and analysis of customer complaints
3. A work force with committees from different functional departments should be set up to evaluate customer groups identification and customer expectations gathering methods.
4. The organisation should identify the elements that are important to customer satisfaction. It strives to provide total customer solutions by responding to all of these elements.
5. The organisation should have an effective complaint management process. This process of complaint management should cover data gathering, records, investigation and analysis, improvement suggestion, review, implementation, and validation.
6. The customer contact performance and complaint system are required to assess and improve continuously.

Implications on Category 5 – Results Orientation

5(a) Customer Focus

1. Customer satisfaction and dissatisfaction measurements include both a numerical rating and descriptors assigned to each unit in the scale.
2. Several customer satisfaction indicators are used (for example, repeat business measures, praise letters, and direct measures using survey questions and interviews).
3. Customer dissatisfaction indicators include complaints, claims, refunds, recalls, returns, repeat services, litigation, replacements, performance rating downgrades, repairs, warranty work, warranty costs, and incomplete orders.

5(b,c,d) Financial Results, Non-Financial Results and Organisational Effectiveness

1. The organisation should have a healthy financial situation and good financial and non-financial performance.
2. The organisation should have both short- and long-term strategy for safeguarding the organisational effectiveness.
3. Data collected at functional, work unit and individual worker levels are consistent across the organisation to permit consolidation and performance monitoring.
4. There are different kinds of performance data, for example, quality and operational data are used for management decisions; internal and external data are used to describe customer satisfaction and product/service performance; the cost of quality (including rework, delay, waste, scrap, errors) and other financial concerns are measured for internal operations and processes; and supplier performance data are used to maintain the quality of the supplied materials.
5. The organisation measures the performance by facts, for example, service quality, quality costs, yield rate, downtime, engineering changes, billing errors, and nonconformance.
6. There should be frequent contact with customers (e.g., quarterly and monthly). There should also be a variety of different follow-up methods, such as phone calls, mail surveys, and focus groups.
7. Measures and monitoring controls should be set up to ensure the progress of continuous improvement, as well as good reputation and overall image.

5(e) Social Responsibilities

1. The organisation's principal business activities include systems to analyse, anticipate, and minimise public hazards or risk.
2. The organisation considers the impact that its operations, products, and services might have on society and considers those impacts in planning.
3. The organisation should act as a role model for the public. Employees should be educated for proper ethical behavior. All harmful operations, products, and services should be prevented. The organisation should support the community

through the application of quality awards, giving presentation, and supporting educational institutes.

4. McDonald's created Ronald McDonald House that was the charity to help parents with sick children. The money they spend helps parents and kids all over the world, but it also helps promote McDonald's image.

Appendix 5:

Evaluation Instrument of Performance Self-assessment Survey

The purpose of this survey questionnaire *is to acquire respondents' views on the current and expected performance status of their organisations with respect to a set of self-assessment criteria. Your* answers will be treated confidentiality and the names of companies, business units, products or individuals will not be released. All questions can be quickly answered by checking boxes.

Section A: General information

Name of the Organisation: _____

Name of the Respondent: _____

Position and/or Job Title: _____

Years of Service in Position: _____

Industry Type and/or Sector: _____

Number of employees: _____

Business Nature and Ownership: _____

Section B: Self-assessment Criteria

This section has five parts of criteria and two scoring columns for self-assessment of organisation performance. Please circle the numbers in each column that can represent mostly your views on the performance status of individual items of criteria in each part that you see them today and you expect them after a year.

Scoring Guide: **1** *= the lowest or worst score;* **10** *= the highest or best score*

Example:

1(a) Corporate Mission and Values 1 2 3 4 (5) 6 7 8 9 10 1 2 3 4 5 6 7 (8) 9 10

Indicating that you see the organisation has corporate mission and values in place but not obvious clear at the moment (with a score of 5). You expect that considerable improvements will happen after a year (with a score of 8)

	What do you see today?	***What do you expect a year later?***
B.1 Leadership and Constancy of Purposes		
1(a) Corporate Mission and Values	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
1(b) Management Involvement	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
1(c) Management Commitment	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
1(d) Development of Strategy and Policy	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
B.2 Management by Processes		
2(a) Product and Service Processes	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
2(b) Sharing of Information	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
2(c) Sharing of Knowledge	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
2(d) Implementation of Strategy/Policy	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
B.3 People Development		
3(a) People Education and Training	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
3(b) People Well-being and Satisfaction	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
3(c) People Involvement	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
3(d) People Empowerment	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
B.4 Continuous Improvement		
4(a) Learning Culture	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
4(b) Continuous Innovation	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
4(c) Review and Update of Strategy/Policy	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
4(d) Balancing Stakeholders' Needs	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
B.5 Results Orientation		
5(a) Customer and Market Focus	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
5(b) Financial Results (e.g., profitability)	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
5(c) Non-financial Results (e.g., reputation)	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
5(d) Organisational Effectiveness	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
5(e) Social Responsibilities	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10

Section C: Other Comments

To what extent do you agree *(use the same scoring guide and circle the number fit you most)*:

a) The above criteria and items can indicate the performance status of your organisation? 1 2 3 4 5 6 7 8 9 10

b) Performance measurement aligns with strategy formulation in your organisation? 1 2 3 4 5 6 7 8 9 10

c) Strategy formulation and performance measurement are inseparable? 1 2 3 4 5 6 7 8 9 10

Thanks for your help and participation in the study

Appendix 6:

Evaluation Records of Questionnaire Survey on Performance Self-Assessment

List of Records:

Record Sheet A-1a. Current-year performance by senior management

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	50	x1.14=	57	2(a)	60	x1.82=	109	3(a)	60	x1.36=	82	4(a)	60	x2.17=	130
Sub-criterion	1(b)	43	x2.00=	86	2(b)	67	x2.73=	183	3(b)	47	x3.64=	171	4(b)	53	x2.61=	138
Sub-criterion	1(c)	57	x4.57=	260	2(c)	67	x2.73=	183	3(c)	50	x1.82=	91	4(c)	67	x2.17=	145
Sub-criterion	1(d)	47	x2.29=	108	2(d)	60	x2.73=	163	3(d)	57	x3.18=	181	4(d)	63	x3.04=	192
Scores Obtained:				511				638				525				605

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	70	x2.64=	185
Sub-criterion	5(b)	73	x2.64=	193
Sub-criterion	5(c)	63	x1.13=	71
Sub-criterion	5(d)	57	x1.89=	108
Sub-criterion	5(e)	60	x1.70=	102
Scores Obtained:				659

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	511	x 0.175	=	89
2. Management by Processes	638	x 0.110	=	70
3. People Development	525	x 0.220	=	116
4. Continuous Improvement	605	x 0.230	=	139
Results Sub-criteria				
5(a) Customer Focus	185	x 0.265	=	49
5(b) Financial Results	193	x 0.265	=	51
5(c) Non-financial Results	71	x 0.265	=	19
5(d) Organisational Effectiveness	108	x 0.265	=	29
5(e) Social Responsibilities	102	x 0.265	=	27

Total Score Points Obtained: 589

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet A-1b. Next-year performance by senior management

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	57	x1.14=	65	2(a)	57	x1.82=	104	3(a)	73	x1.36=	99	4(a)	77	x2.17=	167
Sub-criterion	1(b)	50	x2.00=	100	2(b)	73	x2.73=	199	3(b)	70	x3.64=	255	4(b)	73	x2.61=	191
Sub-criterion	1(c)	63	x4.57=	288	2(c)	77	x2.73=	209	3(c)	77	x1.82=	140	4(c)	77	x2.17=	167
Sub-criterion	1(d)	60	x2.29=	137	2(d)	80	x2.73=	218	3(d)	80	x3.18=	254	4(d)	77	x3.04=	234
Scores Obtained:				**590**				**730**				**748**				**759**

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	83	x2.64=	219
Sub-criterion	5(b)	80	x2.64=	211
Sub-criterion	5(c)	90	x1.13=	102
Sub-criterion	5(d)	80	x1.89=	151
Sub-criterion	5(e)	73	x1.70=	124
Scores Obtained:				**807**

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	**590**	x 0.175	=	103
2. Management by Processes	**730**	x 0.110	=	80
3. People Development	**748**	x 0.220	=	165
4. Continuous Improvement	**759**	x 0.230	=	175
Results Sub-criteria				
5(a) Customer Focus	**219**	x 0.265	=	58
5(b) Financial Results	**211**	x 0.265	=	56
5(c) Non-financial Results	**102**	x 0.265	=	27
5(d) Organisational Effectiveness	**151**	x 0.265	=	40
5(e) Social Responsibilities	**124**	x 0.265	=	33

Total Score Points Obtained: 737

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet A-1c. Current-year performance by representatives

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	57	x1.14=	65	2(a)	66	x1.82=	120	3(a)	59	x1.36=	80	4(a)	70	x2.17=	152
Sub-criterion	1(b)	59	x2.00=	118	2(b)	53	x2.73=	144	3(b)	54	x3.64=	197	4(b)	67	x2.61=	175
Sub-criterion	1(c)	64	x4.57=	292	2(c)	57	x2.73=	155	3(c)	51	x1.82=	93	4(c)	64	x2.17=	139
Sub-criterion	1(d)	60	x2.29=	137	2(d)	69	x2.73=	188	3(d)	57	x3.18=	181	4(d)	51	x3.04=	155
Scores Obtained:				**612**				**607**				**551**				**621**

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	67	x2.64=	177
Sub-criterion	5(b)	67	x2.64=	177
Sub-criterion	5(c)	67	x1.13=	76
Sub-criterion	5(d)	63	x1.89=	119
Sub-criterion	5(e)	56	x1.70=	95
Scores Obtained:				**644**

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	612	x 0.175	=	107
2. Management by Processes	607	x 0.110	=	67
3. People Development	551	x 0.220	=	121
4. Continuous Improvement	621	x 0.230	=	143
Results Sub-criteria				
5(a) Customer Focus	177	x 0.265	=	47
5(b) Financial Results	177	x 0.265	=	47
5(c) Non-financial Results	76	x 0.265	=	20
5(d) Organisational Effectiveness	119	x 0.265	=	32
5(e) Social Responsibilities	95	x 0.265	=	25

Total Score Points Obtained: 609

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet A-1d. Next-year performance by representatives

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	63	x1.14=	72	2(a)	71	x1.82=	129	3(a)	63	x1.36=	86	4(a)	77	x2.17=	167
Sub-criterion	1(b)	64	x2.00=	126	2(b)	57	x2.73=	155	3(b)	61	x3.64=	222	4(b)	76	x2.61=	198
Sub-criterion	1(c)	64	x4.57=	292	2(c)	60	x2.73=	163	3(c)	59	x1.82=	107	4(c)	74	x2.17=	161
Sub-criterion	1(d)	69	x2.29=	158	2(d)	73	x2.73=	199	3(d)	64	x3.18=	204	4(d)	56	x3.04=	170
Scores Obtained:				648				646				619				696

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	74	x2.64=	195
Sub-criterion	5(b)	71	x2.64=	187
Sub-criterion	5(c)	70	x1.13=	79
Sub-criterion	5(d)	69	x1.89=	130
Sub-criterion	5(e)	57	x1.70=	97
Scores Obtained:				688

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	648	x 0.175	=	113
2. Management by Processes	646	x 0.110	=	71
3. People Development	619	x 0.220	=	136
4. Continuous Improvement	696	x 0.230	=	160
Results Sub-criteria				
5(a) Customer Focus	195	x 0.265	=	52
5(b) Financial Results	187	x 0.265	=	50
5(c) Non-financial Results	79	x 0.265	=	21
5(d) Organisational Effectiveness	130	x 0.265	=	34
5(e) Social Responsibilities	97	x 0.265	=	26

Total Score Points Obtained: 663

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet B-2a. Current-year performance by senior management

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	80	x1.14=	91	2(a)	65	x1.82=	118	3(a)	75	x1.36=	102	4(a)	65	x2.17=	141
Sub-criterion	1(b)	75	x2.00=	150	2(b)	65	x2.73=	177	3(b)	50	x3.64=	182	4(b)	45	x2.61=	117
Sub-criterion	1(c)	75	x4.57=	343	2(c)	55	x2.73=	150	3(c)	55	x1.82=	100	4(c)	45	x2.17=	98
Sub-criterion	1(d)	75	x2.29=	172	2(d)	60	x2.73=	163	3(d)	50	x3.18=	159	4(d)	60	x3.04=	182
Scores Obtained:				**756**				**608**				**543**				**538**

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	75	x2.64=	198
Sub-criterion	5(b)	65	x2.64=	172
Sub-criterion	5(c)	60	x1.13=	68
Sub-criterion	5(d)	55	x1.89=	104
Sub-criterion	5(e)	55	x1.70=	94
Scores Obtained:				**636**

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	756	x 0.175	=	132
2. Management by Processes	608	x 0.110	=	67
3. People Development	543	x 0.220	=	119
4. Continuous Improvement	538	x 0.230	=	124
Results Sub-criteria				
5(a) Customer Focus	198	x 0.265	=	52
5(b) Financial Results	172	x 0.265	=	46
5(c) Non-financial Results	68	x 0.265	=	18
5(d) Organisational Effectiveness	104	x 0.265	=	28
5(e) Social Responsibilities	94	x 0.265	=	25

Total Score Points Obtained: 611

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet B-2b. Next-year performance by senior management

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	80	x1.14=	91	2(a)	65	x1.82=	118	3(a)	75	x1.36=	102	4(a)	75	x2.17=	163
Sub-criterion	1(b)	75	x2.00=	150	2(b)	70	x2.73=	190	3(b)	45	x3.64=	164	4(b)	50	x2.61=	131
Sub-criterion	1(c)	75	x4.57=	343	2(c)	60	x2.73=	163	3(c)	50	x1.82=	91	4(c)	55	x2.17=	119
Sub-criterion	1(d)	85	x2.29=	195	2(d)	70	x2.73=	190	3(d)	65	x3.18=	207	4(d)	55	x3.04=	167
Scores Obtained:				779				661				564				580

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	80	x2.64=	211
Sub-criterion	5(b)	75	x2.64=	198
Sub-criterion	5(c)	60	x1.13=	68
Sub-criterion	5(d)	70	x1.89=	132
Sub-criterion	5(e)	70	x1.70=	119
Scores Obtained:				728

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	779	x 0.175	=	136
2. Management by Processes	661	x 0.110	=	73
3. People Development	564	x 0.220	=	124
4. Continuous Improvement	580	x 0.230	=	133
Results Sub-criteria				
5(a) Customer Focus	211	x 0.265	=	56
5(b) Financial Results	198	x 0.265	=	52
5(c) Non-financial Results	68	x 0.265	=	18
5(d) Organisational Effectiveness	132	x 0.265	=	35
5(e) Social Responsibilities	119	x 0.265	=	32

Total Score Points Obtained: 659

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet B-2c. Current-year performance by representatives

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	66	x1.14=	75	2(a)	61	x1.82=	111	3(a)	49	x1.36=	67	4(a)	54	x2.17=	117
Sub-criterion	1(b)	53	x2.00=	106	2(b)	60	x2.73=	163	3(b)	41	x3.64=	149	4(b)	51	x2.61=	133
Sub-criterion	1(c)	55	x4.57=	251	2(c)	55	x2.73=	150	3(c)	49	x1.82=	89	4(c)	54	x2.17=	117
Sub-criterion	1(d)	56	x2.29=	128	2(d)	56	x2.73=	152	3(d)	49	x3.18=	156	4(d)	49	x3.04=	149
Scores Obtained:				**560**				**576**				**461**				**516**

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	65	x2.64=	172
Sub-criterion	5(b)	63	x2.64=	166
Sub-criterion	5(c)	59	x1.13=	67
Sub-criterion	5(d)	56	x1.89=	106
Sub-criterion	5(e)	56	x1.70=	95
Scores Obtained:				**606**

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	**560**	x 0.175	=	98
2. Management by Processes	**576**	x 0.110	=	63
3. People Development	**461**	x 0.220	=	101
4. Continuous Improvement	**516**	x 0.230	=	119
Results Sub-criteria				
5(a) Customer Focus	**172**	x 0.265	=	46
5(b) Financial Results	**166**	x 0.265	=	44
5(c) Non-financial Results	**67**	x 0.265	=	18
5(d) Organisational Effectiveness	**106**	x 0.265	=	28
5(e) Social Responsibilities	**95**	x 0.265	=	25

Total Score Points Obtained: 542

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet B-2d. Next-year performance by representatives

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	67	x1.14=	76	2(a)	68	x1.82=	124	3(a)	63	x1.36=	86	4(a)	66	x2.17=	143
Sub-criterion	1(b)	61	x2.00=	122	2(b)	73	x2.73=	199	3(b)	53	x3.64=	193	4(b)	66	x2.61=	172
Sub-criterion	1(c)	65	x4.57=	297	2(c)	71	x2.73=	193	3(c)	55	x1.82=	100	4(c)	64	x2.17=	139
Sub-criterion	1(d)	66	x2.29=	151	2(d)	68	x2.73=	185	3(d)	61	x3.18=	194	4(d)	54	x3.04=	164
Scores Obtained:				**646**				**701**				**573**				**618**

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	68	x2.64=	180
Sub-criterion	5(b)	70	x2.64=	185
Sub-criterion	5(c)	62	x1.13=	70
Sub-criterion	5(d)	63	x1.89=	119
Sub-criterion	5(e)	58	x1.70=	99
Scores Obtained:				**653**

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	**646**	x 0.175	=	113
2. Management by Processes	**701**	x 0.110	=	[illegible]
3. People Development	**573**	x 0.220	=	126
4. Continuous Improvement	**618**	x 0.230	=	142
Results Sub-criteria				
5(a) Customer Focus	**180**	x 0.265	=	48
5(b) Financial Results	**185**	x 0.265	=	49
5(c) Non-financial Results	**70**	x 0.265	=	19
5(d) Organisational Effectiveness	**119**	x 0.265	=	32
5(e) Social Responsibilities	**99**	x 0.265	=	26

Total Score Points Obtained: 632

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet C-3a. Current-year performance by senior management

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	65	x1.14=	74	2(a)	60	x1.82=	109	3(a)	55	x1.36=	75	4(a)	60	x2.17=	130
Sub-criterion	1(b)	70	x2.00=	140	2(b)	65	x2.73=	177	3(b)	60	x3.64=	218	4(b)	55	x2.61=	144
Sub-criterion	1(c)	70	x4.57=	320	2(c)	60	x2.73=	163	3(c)	65	x1.82=	118	4(c)	50	x2.17=	109
Sub-criterion	1(d)	65	x2.29=	149	2(d)	60	x2.73=	163	3(d)	60	x3.18=	191	4(d)	50	x3.04=	152
Scores Obtained:				**683**				**612**				**602**				**535**

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	60	x2.64=	158
Sub-criterion	5(b)	65	x2.64=	172
Sub-criterion	5(c)	55	x1.13=	62
Sub-criterion	5(d)	60	x1.89=	113
Sub-criterion	5(e)	60	x1.70=	102
Scores Obtained:				**607**

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	683	x 0.175	=	120
2. Management by Processes	612	x 0.110	=	67
3. People Development	602	x 0.220	=	132
4. Continuous Improvement	535	x 0.230	=	123
Results Sub-criteria				
5(a) Customer Focus	158	x 0.265	=	42
5(b) Financial Results	172	x 0.265	=	46
5(c) Non-financial Results	62	x 0.265	=	16
5(d) Organisational Effectiveness	113	x 0.265	=	30
5(e) Social Responsibilities	102	x 0.265	=	27

Total Score Points Obtained: 603

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet C-3b. Next-year performance by senior management

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	65	x1.14=	74	2(a)	70	x1.82=	127	3(a)	70	x1.36=	95	4(a)	70	x2.17=	152
Sub-criterion	1(b)	70	x2.00=	140	2(b)	70	x2.73=	190	3(b)	80	x3.64=	218	4(b)	65	x2.61=	170
Sub-criterion	1(c)	75	x4.57=	343	2(c)	65	x2.73=	177	3(c)	60	x1.82=	109	4(c)	65	x2.17=	141
Sub-criterion	1(d)	70	x2.29=	160	2(d)	65	x2.73=	177	3(d)	65	x3.18=	207	4(d)	50	x3.04=	152
Scores Obtained:				717				671				629				615

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	70	x2.64=	185
Sub-criterion	5(b)	75	x2.64=	198
Sub-criterion	5(c)	65	x1.13=	73
Sub-criterion	5(d)	75	x1.89=	142
Sub-criterion	5(e)	60	x1.70=	102
Scores Obtained:				**700**

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	717	x 0.175	=	125
2. Management by Processes	671	x 0.110	=	74
3. People Development	629	x 0.220	=	138
4. Continuous Improvement	615	x 0.230	=	141
Results Sub-criteria				
5(a) Customer Focus	185	x 0.265	=	49
5(b) Financial Results	198	x 0.265	=	52
5(c) Non-financial Results	73	x 0.265	=	19
5(d) Organisational Effectiveness	142	x 0.265	=	38
5(e) Social Responsibilities	102	x 0.265	=	27

Total Score Points Obtained: 663

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet C-3c. Current-year performance by representatives

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	63	x1.14=	72	2(a)	63	x1.82=	115	3(a)	60	x1.36=	82	4(a)	60	x2.17=	130
Sub-criterion	1(b)	67	x2.00=	134	2(b)	63	x2.73=	171	3(b)	70	x3.64=	255	4(b)	63	x2.61=	164
Sub-criterion	1(c)	57	x4.57=	260	2(c)	63	x2.73=	171	3(c)	63	x1.82=	115	4(c)	57	x2.17=	124
Sub-criterion	1(d)	60	x2.29=	137	2(d)	60	x2.73=	163	3(d)	60	x3.18=	191	4(d)	57	x3.04=	173
Scores Obtained:				**603**				**620**				**643**				**591**

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	67	x2.64=	177
Sub-criterion	5(b)	63	x2.64=	166
Sub-criterion	5(c)	60	x1.13=	68
Sub-criterion	5(d)	63	x1.89=	119
Sub-criterion	5(e)	63	x1.70=	107
Scores Obtained:				637

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	603	x 0.175	=	106
2. Management by Processes	620	x 0.110	=	68
3. People Development	643	x 0.220	=	141
4. Continuous Improvement	591	x 0.230	=	136
Results Sub-criteria				
5(a) Customer Focus	177	x 0.265	=	47
5(b) Financial Results	166	x 0.265	=	44
5(c) Non-financial Results	68	x 0.265	=	18
5(d) Organisational Effectiveness	119	x 0.265	=	32
5(e) Social Responsibilities	107	x 0.265	=	28

Total Score Points Obtained: 620

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).

Record Sheet C-3d. Next-year performance by representatives

1. Enabler Dimensions of Criteria

Item Numbers	1	%		Score	2	%		Score	3	%		Score	4	%		Score
Sub-criterion	1(a)	73	x1.14=	83	2(a)	77	x1.82=	140	3(a)	70	x1.36=	95	4(a)	70	x2.17=	152
Sub-criterion	1(b)	73	x2.00=	146	2(b)	80	x2.73=	218	3(b)	77	x3.64=	280	4(b)	70	x2.61=	183
Sub-criterion	1(c)	73	x4.57=	334	2(c)	80	x2.73=	218	3(c)	73	x1.82=	133	4(c)	67	x2.17=	145
Sub-criterion	1(d)	77	x2.29=	176	2(d)	70	x2.73=	190	3(d)	77	x3.18=	245	4(d)	63	x3.04=	192
Scores Obtained:				739				766				753				672

Note: 1) The score obtained is the arithmetic average of the % scores for the sub-criteria.
2) If applications present convincing reasons why one or more parts are not relevant to the organisation it is valid to calculate the average on the number of criterion addressed.

2. Results Criterion

Item Numbers	5	%		Score
Sub-criterion	5(a)	70	x2.64=	185
Sub-criterion	5(b)	70	x2.64=	185
Sub-criterion	5(c)	60	x1.13=	68
Sub-criterion	5(d)	70	x1.89=	132
Sub-criterion	5(e)	70	x1.70=	119
Scores Obtained:				689

3. Calculation of Total Score Points

Criteria and Sub-criteria	Scores Obtained	Factors		Points Obtained
Enablers Criteria:				
1. Leadership and Constancy of Purposes	739	x 0.175	=	129
2. Management by Processes	766	x 0.110	=	84
3. People Development	753	x 0.220	=	166
4. Continuous Improvement	672	x 0.230	=	155
Results Sub-criteria				
5(a) Customer Focus	185	x 0.265	=	49
5(b) Financial Results	185	x 0.265	=	49
5(c) Non-financial Results	68	x 0.265	=	18
5(d) Organisational Effectiveness	132	x 0.265	=	35
5(e) Social Responsibilities	119	x 0.265	=	32

Total Score Points Obtained: 717

Note: 1) Enter the scores obtained to each criterion of Section 1 and sub-criterion of Section 2 above.
2) Multiply each score by appropriate conversion factors to give the points obtained.
3) Add points obtained to each criterion to give total score points (i.e., the overall performance index).